

**CEE Annual Industry Report**

# **2019** State of the Efficiency Program Industry

**BUDGETS, EXPENDITURES, AND IMPACTS**

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## Purpose and Limitations

The purpose of this report is to provide a point in time report of US and Canadian program industry energy efficiency and demand response budgets, expenditures, and savings and an annual time series analysis. While this effort constitutes a large and comprehensive survey of program administrators, and while extensive ongoing attention is devoted to data standardization, CEE cautions against making representations and comparisons beyond those provided in this report.

The report documents annual electric and natural gas DSM program industry budgets, expenditures, and impacts at the national level and, where appropriate, by Census region, across the United States and Canada based on data collected through a vast and comprehensive survey of DSM program administrators. CEE believes that using these data in conjunction with past survey efforts portrays an accurate representation of energy efficiency program industry trends over time. The limitations of the data are disclosed below.

There are many limitations to budget, expenditures, and savings data in the DSM industry. First, this survey represents self-reported data by an individual or group of individuals within each responding organization. Although CEE and our collaborator, the American Gas Association, work closely with each responding organization to help respondents properly interpret survey questions and enter the correct information, the accuracy of the data is not verified outside of these efforts. Second, respondents provide data at different times during the data collection period from June to October, and not all program administrators report their information according to the calendar year. CEE and our collaborator have sought greater consistency in data collection from respondents over the years, however, the accuracy of the data is ultimately dependent upon each individual respondent's interpretation of the survey questions, ability to retrieve the relevant information, and verification of the data provided. Furthermore, variation in state policies and reporting requirements along with what we suspect is inconsistent use of terminology likely adds to variation.

Additional factors that affect the viability of comparisons or analytical inferences include differences in regulatory structures, weather effects, customer demographic differences, electric and gas rates, the duration of

program experience, and underlying drivers that shape a program administrator's portfolio.

Given the wide variation in the circumstances surrounding individual data points, we do not believe these data are suitable for comparisons at any level other than the levels represented within this report. CEE encourages reviewers to inquire as to the sufficiency of the method or quality of supplemental data for the specified purpose when using this information beyond the stated limits.

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## Acknowledgements

CEE would like to thank the gas and electric energy efficiency and demand response program administrators in the United States and Canada that participated in this year's industry data collection. We appreciate the time and effort given by all survey respondents throughout the data collection process, including extensive clarification and follow-up. CEE is also grateful to members who have provided feedback and insights on this work over the years.

CEE appreciates our continuing collaboration with the American Gas Association (AGA), which provides natural gas industry data collected from their members for a similar research effort. CEE extends special thanks to Sapna Gheewala and Paul Pierson of the American Gas Association for their coordination on survey development and the logistics of data collection.

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Also, please state clearly in your analysis that whereas you are "using CEE data, the analysis is yours alone."

## Executive Summary

This report concludes CEE's fourteenth consecutive data collection effort and annual report publication. The primary purpose of the survey and accompanying report is to capture industry budgets, expenditures, and impacts over time to enable assessment of overall industry trends. This year's report highlights 2019 budget data<sup>1</sup> and 2018 expenditure and impact<sup>2</sup> data compared to previously reported figures to assess industry growth and observe significant changes.

In 2019, the *State of the Efficiency Program Industry Report* continues to illustrate the growth of the energy efficiency industry. Analysis of the data reported by US and Canadian program administrators continues to support the recent trend of increasing demand side management (DSM<sup>3</sup>) program expenditures. In 2018, combined spending on gas and electric DSM programs across the United States and Canada totaled \$8.9 billion from all sources and \$8 billion from ratepayers. Industry expenditures are down one percent compared to 2017 expenditures from all sources but represent an 11 percent increase over the last five years. CEE member programs accounted for almost \$6 billion, or 68 percent, of these expenditures. US and Canadian DSM ratepayer-funded programs are estimated to have saved approximately 36,297 GWh of electricity and over 425 million therms of gas in 2018, which represents 25.7 million metric tons of avoided CO<sub>2</sub> emissions.<sup>4</sup>

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<sup>1</sup> The budget data from survey respondents were collected during the summer and fall of 2019. This report does not capture changes made after that time.

<sup>2</sup> "Impact data" refers to annually reported energy savings data commonly referred to as "ex ante" savings estimates. Ex ante savings are forecasted savings figures used for program and portfolio planning and reporting purposes. DSM program evaluators often review and revise ex ante savings during program or portfolio impact evaluation studies.

<sup>3</sup> For the purposes of this report, DSM programs encompass both energy efficiency (EE) and demand response (DR) funding.

<sup>4</sup> Calculated using the EPA Greenhouse Gas Equivalencies Calculator, "Greenhouse Gas Equivalencies Calculator," Environmental Protection Agency, accessed April 2020, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Other key findings from this year's industry data collection include the following, listed in US dollars (USD):

### **Binational Trends: DSM Programs in the United States and Canada**

- In 2018, US and Canadian combined gas and electric DSM program budgets from ratepayer funds totaled over \$8.5 billion out of the \$8.6 billion budgeted from all sources. This represents an eleven percent decrease from 2018 ratepayer funded budgets.
- In 2018, US and Canadian program administrators spent \$974 million from all sources—over 98 percent of which came from ratepayers—on demand response programs. This represents a five percent increase over 2017 levels.
- Natural gas program expenditures in the United States and remained steady between 2017 and 2018, totaling \$1.47 billion.
- The largest sources of non-ratepayer funding budgeted for 2019 US electric DSM activity included wholesale capacity market revenues (two percent) and the Regional Greenhouse Gas Initiative (one percent of total budgets). US electric and gas program administrators also cited several miscellaneous sources,<sup>5</sup> while Canadian electric and gas program administrators reported nearly 100 percent ratepayer funding.

### **Gas and Electric DSM in the United States:**

- US gas and electric DSM expenditures totaled \$8.9 billion from all sources and over \$8.0 billion from ratepayers in 2018, representing an increase of about one percent for expenditures from all sources and a decrease of less than one percent for ratepayer funding as compared to 2017. This represents an 11 percent increase in US DSM expenditures over the last five years.
- US DSM expenditures in 2018 represented nearly 0.04 percent of US GDP and 2.52 percent of value added<sup>6</sup> by the US utility industry.

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<sup>5</sup> Miscellaneous sources of funding included state funding and shareholder funding.

<sup>6</sup> The US Department of Commerce Bureau of Economic Analysis defines value added, or the GDP-by-industry as "the contribution of a private industry or government sector to overall GDP... Value added equals the difference between an industry's gross output ... and the cost of its intermediate inputs." "Frequently Asked Questions: What is industry value added?" US Department of Commerce Bureau of Economic Analysis, accessed April 2019, [bea.gov/faq/index.cfm?faq\\_id=184](https://www.bea.gov/faq/index.cfm?faq_id=184).

- Ratepayer-funded programs resulted in 37,304 GWh of gross incremental electric savings and over 519 million therms of gas savings in 2018.

### **Gas and Electric DSM in Canada:**

- Canadian gas and electric DSM program expenditures decreased compared to 2017 in 2018, to \$644 million USD, down about three percent.
- Canadian DSM expenditures in 2018 represented 0.04 percent of Canadian GDP and 1.63 percent of value added by the Canadian utility industry.
- In 2018, ratepayer-funded DSM programs resulted in 3,683 GWh of gross incremental electric savings and over 114 million therms of gas savings.

This is the tenth consecutive year of collaboration with the American Gas Association (AGA). Working with AGA has streamlined data collection efforts and helped increase participation and response rates for this survey. The 2019 report reflects data for 313 utility and nonutility program administrators<sup>7,8</sup> operating efficiency programs in all 50 US states, the District of Columbia, and nine Canadian provinces. More information regarding the 2019 data collection process can be found in Section 2.

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<sup>7</sup> Survey respondents include electric and gas CEE members, program administrators who are members of AGA, large program administrators who are not members of either organization, and some other program administrators identified through EIA Form 861 DSM data: “Electric power sales, revenue, and energy efficiency Form EIA-861 detailed data files,” US Energy Information Administration, <http://www.eia.gov/electricity/data/eia861/>.

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# 1 Introduction

Over the past fourteen years, CEE has collected data from demand side management (DSM) program administrators in the United States and Canada to provide insight to industry stakeholders regarding overall trends for the electric and natural gas efficiency program industry. In that time, the data have shown impressive growth in industry expenditures and showcase how energy efficiency and demand response initiatives continue to result in energy savings and demand reductions. Even amidst changes in the national policies affecting the energy industry, US and Canadian DSM expenditures increased nineteen percent between 2010 and 2018 when adjusted for inflation. Thus, the sustained US and Canadian investment summarized in this report supports the value of gas and electric demand side management programs as a cost-effective means of energy resource acquisition and greenhouse gas mitigation.

This report presents trends in 2018 program expenditures and savings and 2019 budgets reported by US and Canadian DSM program administrators, both electric and natural gas. A total of 313 utility and nonutility program administrators operating efficiency programs in all 50 US states, the District of Columbia, and nine Canadian provinces are included in this year's report.<sup>9</sup> While this effort constitutes one of the largest and most comprehensive surveys of program administrators in the United States and Canada and extensive ongoing attention is devoted to data standardization, CEE cautions against making representations and comparisons beyond those provided in this report. As previously indicated in the Purpose and Limitations and in the Terms of Use, limitations in the comparability and consistency of the data reduce their analytical usefulness below the state or sometimes the regional level. Section 2 clarifies these limitations and outlines the reasons why use of this information at any level—state, regional, national, or binational—should not extend beyond the intended purpose stated above.

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<sup>9</sup> CEE improved the way we track and define response rates starting with the 2014 report. See Section 2.1 for more details on this change. Then, with the 2016 report, CEE streamlined the data collection process, details of which are also provided in Section 2.1.

## 1.1 Report Structure

The 2019 State of the Efficiency Program Industry report is divided into eight sections.

- This section, included under the heading of Introduction, provides an overview of the report's scope, key assumptions, and structure.
- Section 2, Data Collection and Limitations, describes the report's methodology and includes detailed information on data collection methods, survey response rates, and the limitations of the data presented in this report.
- Section 3, Demand Side Management Program Funding in the United States and Canada, presents regional and national data and analysis of natural gas and electric DSM programs.
- Section 4, Evaluation, Measurement and Verification, presents analysis of program expenditures in these areas.
- Section 5, Estimated Program Savings and Environmental Impacts, provides estimated national energy savings data from energy efficiency programs in the United States and Canada. These data are reported by country, fuel type, and customer class.

Appendix A provides a list of the electric energy efficiency program categories used in the 2019 survey and discussed throughout the report.

Appendix B contains tables with electric energy efficiency expenditures by program type for each country, grouped by program category, which are also discussed in Section 3 of the report.

Appendix C contains additional figures regarding electric demand response expenditures in the United States by program type. These figures also expand upon information in Section 3.

Additional data tables that accompany this report present energy efficiency and demand response program expenditures and budgets by state and province.<sup>10</sup> These tables also present energy savings aggregated and reported at the regional level for the United States and the national level for Canada. CEE does not report savings data by state or province due to the risk of misinterpreting program cost-effectiveness and because of limitations

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<sup>10</sup> These tables are available at <http://www.cee1.org/annual-industry-reports>.

associated with comparing program savings data, which are further explained in Section 2 of this report.

For more information on this report, or to obtain the Annual Industry Report brochure or graphics produced for this report, please visit [cee1.org](http://cee1.org). For members, the report is posted in the [CEE Forum](#).

## 2 Data Collection and Limitations

This section provides context regarding data collection efforts, in particular participant response rates, program funding, reporting periods, program categories, and exchange rate information. This section also states the limitations of the data required to properly interpret the results of this report.

CEE collected data during the summer and fall of 2019, in conjunction with the American Gas Association (AGA).<sup>11, 12</sup> CEE collected all electric program data while CEE and AGA collaborated to collect gas program data, with AGA collecting the majority of the information. CEE only collected natural gas efficiency information from organizations that are not AGA members, including statewide program administrators. Collaboration with AGA has streamlined data collection and expanded the sample pool of program administrators over the years, and AGA is a major contributor to this report. AGA also publishes additional information on natural gas DSM programs, including a summary of budgets and expenditures as reported here, energy savings data, information on program implementation and evaluation, and regulatory information. Please contact AGA directly for more on these publications, which are available on their website.

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<sup>11</sup> The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 73 million residential, commercial, and industrial natural gas customers in the United States, of which 95 percent—over 69 million customers—receive their gas from AGA members. AGA is an advocate for natural gas utility companies and their customers and provides a broad range of programs and services for member natural gas utilities, pipelines, marketers, gatherers, international natural gas companies, and industry associates. Today natural gas meets more than one-fourth of the United States' energy needs. To find out more, please visit [www.aga.org](http://www.aga.org).

<sup>12</sup> CEE began collaborating with AGA in 2009 to increase the report's coverage of natural gas programs.

CEE administers this survey annually via an online survey<sup>13</sup> to a variety of DSM program administrators, including investor-owned utilities, nonutility program administrators, municipal power providers, and co-ops. The survey frame included previous survey respondents, all member organizations of AGA and CEE,<sup>14</sup> nonmembers who were expected to have significant DSM programs, and some program administrators who submitted data to the Energy Information Administration (EIA).<sup>15</sup> Due to the constantly changing nature of the DSM industry, it is difficult to identify and survey every program administrator. Despite this challenge, CEE has continuously worked to make its sample frame as representative of the current industry as possible.

## 2.1 Response Rates

Data for this report come from a voluntary survey administered to program administrators in the United States and Canada. Because responding organizations may vary by state or province from year to year, caution should be used in comparing data and inferring trends, especially at the state or provincial level. Despite numerous attempts to follow up, not all organizations included in the sample frame respond to the survey each year. Thus, year-to-year changes in the data reported here cannot be entirely attributed to new or expanded programs and new program administrators. Where appropriate, the analyses below include comparisons of only those respondents who provided information in both 2018 and 2019, alongside the analyses of all data collected.

In 2013, CEE began asking respondents to provide public regulatory documents, program plans, and implementation or evaluation documents in the survey. This has allowed us to verify information provided by survey respondents and, in some cases, to update inaccurate information or to

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<sup>13</sup> The electric survey collects information about demand response programs, but the natural gas survey does not because comparable demand response programs do not exist for natural gas.

<sup>14</sup> CEE members include electric and natural gas efficiency program administrators from across the United States and Canada. For more information on CEE membership, please visit [www.cee1.org/content/members](http://www.cee1.org/content/members).

<sup>15</sup> There are many community-owned electric utilities operating efficiency programs in the United States that are not included in this report. The American Public Power Association (APPA) is a nonprofit organization created to serve the nation's more than 2,000 community-owned electric utilities that collectively deliver power to more than 48 million Americans. For more information about APPA or its members, please visit [www.publicpower.org](http://www.publicpower.org).

supplement what we received with public data not provided in the survey. Most importantly, these supplemental documents have allowed CEE to uncover unreported information for program administrators who we expected to have significant DSM budgets, expenditures, or savings.

In 2018, this report reflects data for 313 utility and nonutility program administrators operating DSM programs in 50 US states, the District of Columbia, and nine Canadian provinces. These figures include those organizations accounted for using the streamlined analysis described in the next section. In total, the data collected this year represents ten more organizations than in 2018. As in the past, CEE concludes that this report represents the vast majority of large efficiency program administrators and that the data provided below sufficiently represent the DSM industry in 2018 and 2019.

## 2.2 2016 Data Collection Methodology Change

In 2016, in an effort to streamline the survey process and reduce the survey burden on respondents, CEE staff prioritized outreach to those electric program administrators that represent the majority of industry expenditures. For numerous smaller or historically unresponsive program administrators, information from the Energy Information Administration (EIA)<sup>16</sup> or responses provided in a previous survey year, adjusting for exchange rates and inflation, as appropriate, were incorporated. The organizations for which CEE substituted EIA information or for which CEE carried through information collectively represent less than three percent of total US and Canadian electric DSM expenditures in 2018. This process did not impact the US and Canadian natural gas results. In addition, similar to past years, CEE carried over information from the previous year for a couple of large program administrators that did not respond in 2018, so as to estimate program activity rather than allow totals for these administrators to fall to zero. In 2019, the survey response rate for gas program administrators was lower than normal, and the method of carrying over information from the previous year for the non-respondents was used in these cases as well instead of letting total budgets, expenditures, and savings drop due to response rate, consistent with CEE protocol for the electric survey.

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<sup>16</sup> Data from the 2016 EIA Form 861 collection effort are available at “Electric power sales, revenue, and energy efficiency Form EIA-861 detailed data files,” US Energy Information Administration, <http://www.eia.gov/electricity/data/eia861/>.

## 2.3 Funding Sources

In previous survey years, CEE asked respondents to provide budget and expenditure figures from ratepayer funded sources, as well as to list other sources of funding in the survey. Respondents often listed other sources, such as the American Recovery and Reinvestment Act (ARRA), without providing any supporting data figures to indicate the significance of the additional funding. In 2013, CEE began asking electric survey respondents to report budget and expenditure figures using specifically defined categories that included both ratepayer and nonratepayer sources. In 2014, CEE and AGA also began asking gas survey respondents to report additional funding from nonratepayer sources.<sup>17</sup> These changes were intended to improve the consistency and clarity of survey terminology and reporting categories, as well as to obtain a more comprehensive picture of the industry's financial landscape and identify the relative magnitude of funding from sources other than ratepayers.

CEE defines ratepayer funds as dollars secured through special regulator-approved benefit or on-bill tariff charges that are universally collected as supplemental charges to energy bills.<sup>18</sup> CEE defines nonratepayer funds as funds received from sources such as wholesale capacity market revenues, the Regional Greenhouse Gas Initiative (RGGI) proceeds, and dollars specifically allocated to weatherization assistance programs. As of 2015, CEE no longer asks respondents to report funds dispersed from the American Recovery and Reinvestment Act (ARRA), as no ARRA funds were reported in 2014 and we do not believe any significant sources of these funds exist at this point.

In this report, we disclose total figures that represent all funding sources in charts and graphs depicting historical trends. Where appropriate, the text

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<sup>17</sup> Only natural gas program expenditures and savings derived from ratepayer dollars are identified in this report. In all, gas program administrators reported that 99.7 percent of expenditures in 2018 were made using ratepayer funding. One hundred percent of natural gas savings reported to CEE and AGA were presumably derived from ratepayer funding. Section 3.2, below, addresses nonratepayer sources of funding in 2019 budgets.

<sup>18</sup> More specifically, CEE clarified starting in the 2018 survey that ratepayer funds include "funds derived from system benefit charges, bill surcharges, utility revenues, budget carryover, and transfers from other program administrators that derive funds from any of the above."

specifically notes the percentage of 2019 budgets and 2018 expenditures and savings attributable to ratepayer funds only.

## 2.4 Reporting Period

CEE asked respondents to provide data representing total program budgets for 2019 and total program expenditures and savings for 2018 that aligned with calendar years. CEE defined the budget year for this survey effort as beginning on January 1, 2019 and ending on December 31, 2019. Similarly, CEE defined the “expenditure and savings year” for this survey effort as beginning on January 1, 2018 and ending on December 31, 2018.

In some cases, respondents indicated that their organization reporting cycles did not align with calendar years and that figures reported were not adjusted accordingly. In these cases, CEE requested supplemental information regarding the specific start date and end date for annual budget figures and annual expenditures figures. CEE did not adjust their reported annual figures to align with the calendar year reporting cycle, however. Therefore, please note that some portion of the 2019 industry budget figures and some portion of the 2018 expenditures and savings figures may include data that fall outside of the January 1 to December 31 reporting cycle. Any year identified in this report should be taken to mean the associated program year for all program administrators.

## 2.5 Reporting Categories

This publication groups data into customer classes, as in previous years. Electric customer classes in 2019 include residential, low income where separable from residential, commercial, industrial, commercial and industrial (C&I) where commercial and industrial were not separately reported or distinguishable, cross sector, and demand response. Since 2013, the category of evaluation, measurement and verification (EM&V) used in previous reports is included as part of the cross-sector class, which covers activities that span multiple customer classes. Customer classes in the gas data include residential, low income where separable from residential, multifamily where separable from residential and commercial, commercial, industrial, C&I where commercial and industrial were not separately reported or distinguishable, and other.

In 2013, CEE introduced more granular categories within each electric customer class. The categories used in 2013 were adapted, with a few minor

changes, from a typology developed through another national research effort.<sup>19</sup> CEE has incorporated questions into the survey that ask respondents to report budgets, expenditures, and impact data by program type if possible.<sup>20</sup> In 2019, as in the five previous survey years, CEE also allowed respondents to provide rough percentage breakdowns of their budgets, expenditures, and impacts by program category, even if they could not provide exact dollar or MWh figures for programs. These changes aim to provide more specific information regarding the types of electric programs administered in the United States and Canada and allow for a more nuanced understanding of program offerings moving forward. See Electric Energy Efficiency Program Categories for a list of the program categories used in 2019, which are consistent with the categories used in the previous three years.

As in past years, CEE based demand response program categories on those specified and defined by the US Federal Energy Regulatory Commission (FERC).<sup>21</sup> FERC defines several demand response program types and groups them into two major categories: "incentive-based programs," which tend to involve customer contracts with utilities to curtail load when necessary, and "time-based programs," which generally employ graduated pricing schemes that motivate customers to reduce load during system peaks.

Highlights of collected program data are presented in the appropriate sections below, but these data only represent respondents who chose, or were able to provide information broken out into the specified program categories. The survey asked respondents who could not report at this level of granularity to break their budgets, expenditures, and savings into customer classes only.

The "not broken out" category includes respondent data not further divided into customer classes. These data appear in the binational and national

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<sup>19</sup> Hoffman, Ian M., et al. "Energy Efficiency Program Typology and Data Metrics: Enabling Multi-state Analyses Through the Use of Common Terminology," Lawrence Berkeley National Laboratory, August 2013, <http://emp.lbl.gov/sites/all/files/lbnl-6370e.pdf>.

<sup>20</sup> CEE has incorporated program level questions for the electric survey only. CEE will continue work with our members and with AGA in the future to determine whether this approach is feasible for the gas program administrators surveyed.

<sup>21</sup> CEE sourced demand response terminology from the "2012 Assessment of Demand Response and Advanced Metering: Staff Report," Federal Energy Regulatory Commission, <https://www.ferc.gov/legal/staff-reports/12-20-12-demand-response.pdf>, December 2012.



aggregated totals and charts in this report but, by definition, are not included in the analysis of data by customer classes or program types.

## 2.6 Other Data Limitations

CEE makes every attempt to collect data that align with the definitions and data requirements outlined in the terminology section of the survey. When staff members identify outlying values in the data, we contact respondents and work with them to obtain accurate information. Furthermore, we believe that improvements resulting from the switch to an online survey format have reduced errors over the past several years.

With regard to budgets, considerable room exists for reporting error, and such errors are not always apparent. "Cycle budgets" provide a prime example and are discussed in more detail in Section 3.3. Annual budgets in this report also present limitations, as they illustrate a snapshot from within the data collection period, whereas expenditures and savings from the previous year have often been finalized by the time the survey is fielded.

The data in this publication do not reflect changes to program budgets after the fall of 2019, such as those due to newly approved programs or budget cuts. In addition, carryover of unspent funds from 2018 could result in double counting. In light of the caveats outlined above surrounding annual budgets, this report follows previous ones and focuses on expenditures rather than budgets as the best indicator of energy efficiency program industry investment.

Finally, several issues limit the comparability of data—in particular the savings data—across the United States and Canada. These include, but are not limited to, variations in regulatory requirements or program administrator practices for reporting performance data; differences in the interpretation of the terms used in the survey even when standard definitions are provided; differences in accounting practices among program administrators; variations in formulas used to estimate gross and net program savings; and differences in the focus or goals of programs, which often affect the tracking and reporting of different performance data.

Each regulatory jurisdiction provides specific policies for program administrators in that jurisdiction, which can lead to different assumptions and methods for cost-benefit tests, net-to-gross factors, savings equations, avoided transmission and distribution system line losses, measure

persistence, and incremental savings reporting between states and provinces. For example, some program administrators may only account for incremental savings resulting from installation of efficient equipment using existing codes as a baseline, whereas others are allowed to account for savings using the efficiency of the replaced equipment as a baseline. These different baseline assumptions may lead to significant variations in the savings claimed by different program administrators for the same efficient equipment in the same replacement scenario. CEE believes that for these reasons, savings data in particular should only be aggregated at the US census region level in the United States and at the national level in Canada.

## 2.7 Currency Conversions and Corrections for Inflation

For ease of reading, all currency is reported in nominal US dollars (USD) unless otherwise specified. Where used, Canadian dollars (CAD) are also nominal unless otherwise specified. Real US dollars were calculated using the Bureau of Labor Statistics CPI Inflation Calculator,<sup>22</sup> and real Canadian dollars were calculated using the Bank of Canada CPI Inflation Calculator.<sup>23</sup> This report uses an average annual exchange rate of 0.7848 USD = 1 CAD for the 2018 expenditure and savings information (an average of the daily Federal Reserve<sup>24</sup> exchange rate for January 1, 2018 – December 31, 2018) and an average annual exchange rate of 0.7490 USD = 1 CAD for the 2019 budget information (an average of the daily Federal Reserve exchange rate computed through June 2019).

# 3 Demand Side Management Program Funding in the United States and Canada

## 3.1 Combined DSM Budgets in the United States and Canada

US and Canadian electric and gas DSM program budgets—including both energy efficiency and demand response programs from all surveyed sources—reached \$9.6 billion in 2019, representing a decrease of four percent

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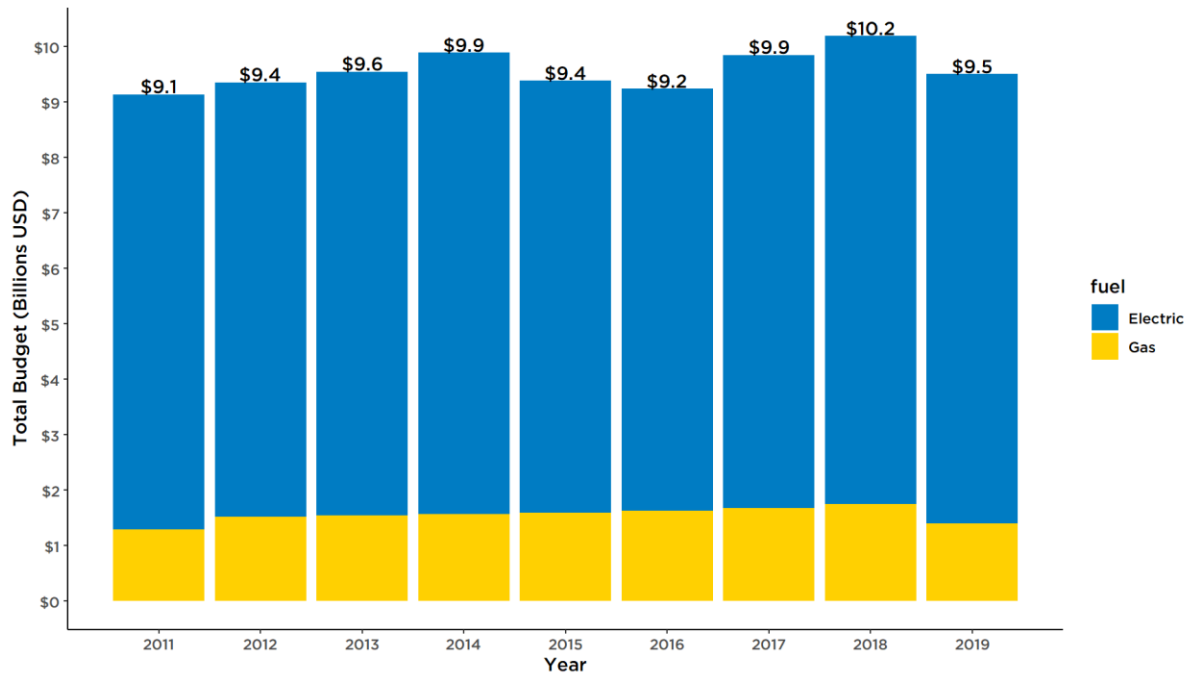
<sup>22</sup> "CPI Inflation Calculator," Bureau of Labor Statistics, accessed March, 30, 2020, [http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm).

<sup>23</sup> "Inflation Calculator," Bank of Canada, accessed March, 30, 2020, <http://www.bankofcanada.ca/rates/related/inflation-calculator/>.

<sup>24</sup> "Canada– Spot Exchange Rate, Canadian \$/US\$," last modified March, 25, 2020, <http://www.federalreserve.gov/releases/h10/Hist/>.

over 2018 (Figure 1).<sup>25</sup> This represents a change in the trend from the past three years. In nominal dollars, 2019 US electric and gas program budgets decreased by one and fifteen percent, respectively, over 2018 and combined Canadian electric and gas budgets decreased about 31 percent.<sup>26</sup> After adjusting for inflation, US electric budgets remained stable compared to 2018, decreasing three percent over 2018, and Canadian electric and gas budgets decreased by 35 and 16 percent each.

Figure 1. US and Canadian DSM Program Budgets—Gas and Electric Combined 2011–2019



<sup>25</sup> Percentage changes in combined US and Canadian data are not adjusted for inflation. Data are adjusted for inflation for each individual country, however, and are identified throughout the report.

<sup>26</sup> It has come to our attention that two large Canadian program administrators merged in 2017. Prior to the 2019 survey effort, both program administrators last provided data for the industry survey in 2016, and that data has been carried over in subsequent years to maintain a consistent panel. In addition, the updated data for the merged company provided in this year’s survey was dramatically lower than the data that had been carried over in previous years. Because the panel of Canadian program administrators is relatively small, this dramatic change in values for two larger administrators had a significant impact on the overall Canadian data. We intend to expand our Canadian panel of program administrators in the 2020 survey effort to ensure the Canadian results are more representative.

Budgets derived exclusively from ratepayer funds accounted for 90 percent, around \$8.6 billion, of the total 2019 budget figure. Figure 1 does not isolate demand response budgets, though in 2019 they represent approximately 10 percent of both the total DSM budgets from all sources, about \$1 billion, and the ratepayer funded DSM budgets, about \$950 million. From 2012 to 2015, the percentage of both the total and ratepayer funded DSM budget figures allocated to demand response programs steadily decreased, dropping from 14 percent to 10 percent. That percentage has remained essentially stable from 2015 to 2019

### 3.2 Funding Sources

In 2019, ratepayer dollars constituted 90.36 percent of funding for electric DSM programs in the United States. Remaining sources of funding included the wholesale capacity markets (two percent), the Regional Greenhouse Gas Initiative (one percent) and unidentified sources (six percent). Regional Greenhouse Gas Initiative (RGGI) funding constituted seven percent of the total funding reported in the northeast region.

In 2019, ratepayer dollars constituted 99.73 percent of funding for natural gas energy efficiency programs in the United States. The remaining 0.03 percent was derived from unidentified sources.

In 2019, 100% percent of Canadian funding for both electric and natural gas DSM programs came from ratepayer funding.

### 3.3 Continued Program Funding

Since 2013, CEE has asked program administrators to report multiyear budgets, referred to in the survey and this report as “cycle budgets,” that provide a glimpse into funding that has been set aside for DSM programs over the next several years. This is primarily a quality assurance procedure in that it allows CEE to verify that budgets for individual program years are not arbitrarily overreported and to estimate single-year budgets when program administrators do not allocate funds on an annual basis. In addition, because DSM activity may ramp up at the beginning of a cycle and down at the end of a cycle, this information explains—and anticipates—certain trends.

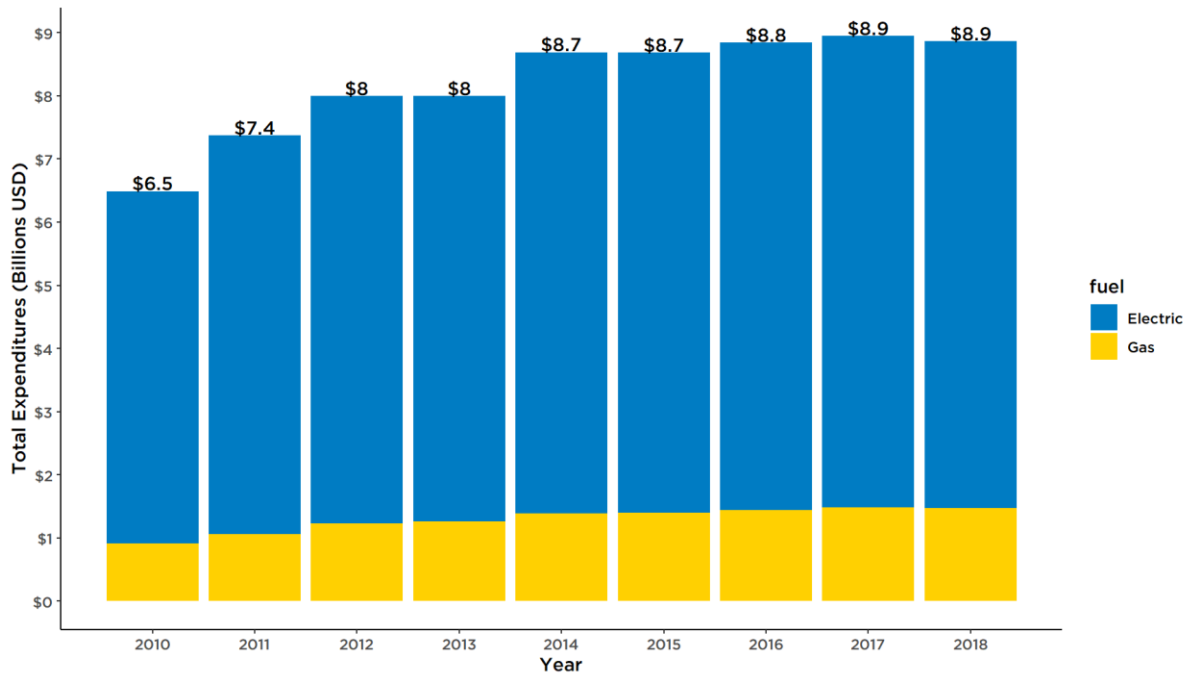
Roughly 13 percent of cycle budgets reported in this year’s survey extend past the end of 2020—41 percent end in 2019, 14 percent in 2020. Although procurement plans for supply-side energy resources may extend several decades into the future, this signifies that multiyear planning is also integral

to DSM activity. Furthermore, in some areas, such as the Pacific Northwest and more recently California, DSM is already anticipated in resource plans spanning a decade or more.

### 3.4 Combined DSM Expenditures in the United States and Canada

DSM expenditures of US and Canadian program administrators incorporated in this year's survey totaled over \$8.9 billion USD in 2018 (a 0.1% decrease over 2017), including \$8.0 billion in expenditures from ratepayer funds, a slight decrease of four percent compared to 2017. The real difference between 2017 and 2018 is similar, with total DSM expenditures decreasing just under two percent from all sources when inflation is taken into account. Figure 2 below illustrates the historic trend of combined US and Canadian DSM expenditures over the years.

Figure 2. US and Canadian DSM Program Expenditures—Gas and Electric Combined 2010–2018



Although not isolated in Figure 2, demand response expenditures represent 11 percent of total expenditures in 2018 independent of funding source. This is roughly one percent greater than the proportion of total DSM expenditures spent on demand response in 2017, 10 percent, though still less than the proportion spent on demand response from 2012 to 2014, when demand

response accounted for between 13 and 14 percent of total DSM program expenditures.

CEE has previously noted that increases in the number of survey respondents year after year could explain some of the historical growth in budgets, expenditures, and savings.<sup>27</sup> As explained in Section 2.1, Response Rates, despite our best efforts, Figure 2 does not depict expenditures year after year from the exact same pool of survey respondents.<sup>28</sup> However, the streamlined survey process described in Section 2.1, whereby 2016, 2017, and 2018 electric responses were supplemented with other information sources, in part resulted in an exceptionally similar pool of electric program administrators between those survey years.

### 3.5 United States DSM Trends

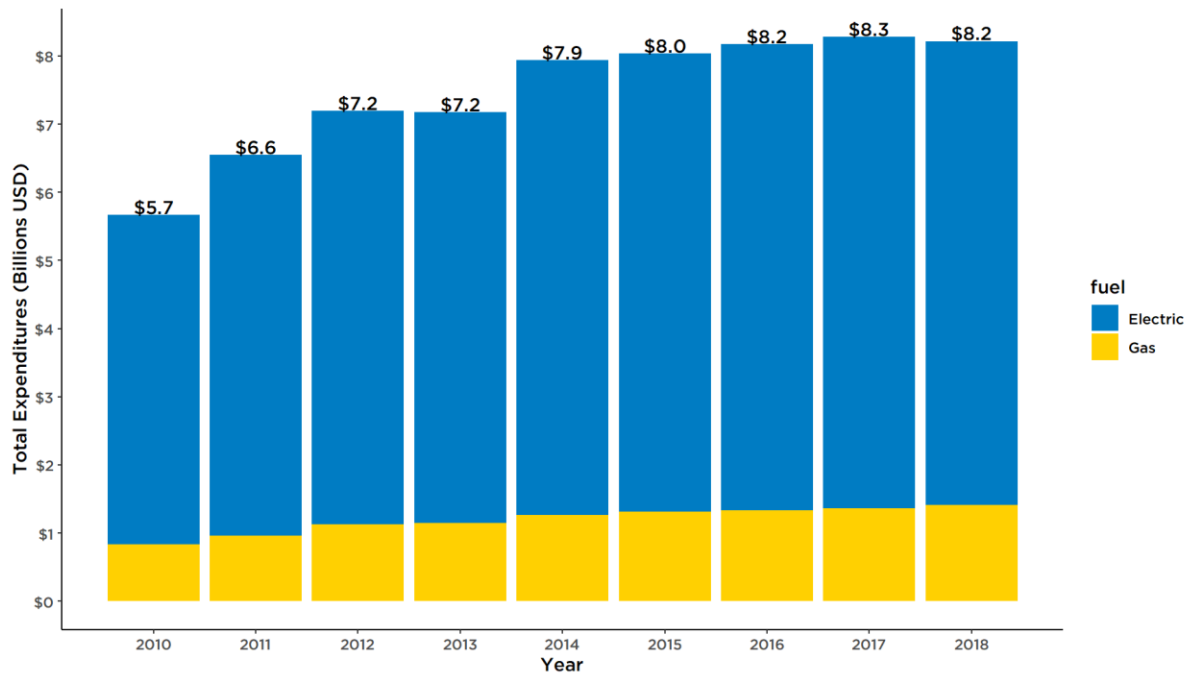
US administrators spent nearly \$8.2 billion<sup>29</sup> from all sources for gas and electric DSM programs in 2018, as illustrated in 0. This total includes both energy efficiency and demand response.

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<sup>27</sup> Please note that as the CEE survey panel now contains most large program administrators in the United States, and most of the larger program administrators in Canada. For the 2020 survey effort, CEE is reexamining the Canadian panel and hopes to improve the representativeness of the panel. CEE believes that since 2012, the United States panel of survey respondents targeted each year for data is representative of DSM industry at large.

<sup>29</sup> \$6.4 billion of these expenditures were derived solely from ratepayers, an approximately one percent decrease from 2016 in nominal dollars, a less than two percent decrease when adjusted for inflation.

Figure 3. US DSM Expenditures—Gas and Electric Combined 2010–2018



2018 gas and electric DSM expenditures in the United States decreased one percent over 2017 expenditures in nominal dollars, a two percent decrease when adjusted for inflation. Over the past five years, US inflation-adjusted DSM expenditures have increased 11 percent. The \$8.2 billion spent by US DSM program administrators represents 0.04 percent of 2018 US gross domestic product and 2.52 percent of the value added by the US utility industry to gross domestic product in 2018.<sup>30</sup>

In 2019, natural gas and electric DSM program administrators in the United States budgeted nearly \$8.9 billion from all sources, a slight increase (two percent) relative to 2018 when adjusted for inflation.

### 3.5.1 United States Electric DSM Trends

In 2018, US program administrators spent over \$6.8 billion on electric DSM programs, a one percent decrease compared to 2017 expenditures, a decrease

<sup>30</sup> Comparisons in this paragraph are based on data from the US Department of Commerce Bureau of Economic Analysis: [https://www.bea.gov/iTable/index\\_industry\\_gdpIndy.cfm](https://www.bea.gov/iTable/index_industry_gdpIndy.cfm), Most recent update: April, 2020.

of approximately two percent when accounting for inflation.<sup>31,32</sup> Figure 4 below presents the breakdown of US electric expenditures from 2013 to 2018 by customer class, which represents the sum of either program level data rolled up to customer classes or customer class data provided directly by respondents. "Not broken out"<sup>33</sup> contains data that program administrators could not allocate to a specific program or customer class.

Figure 4. US Electric DSM Expenditures 2010-2018

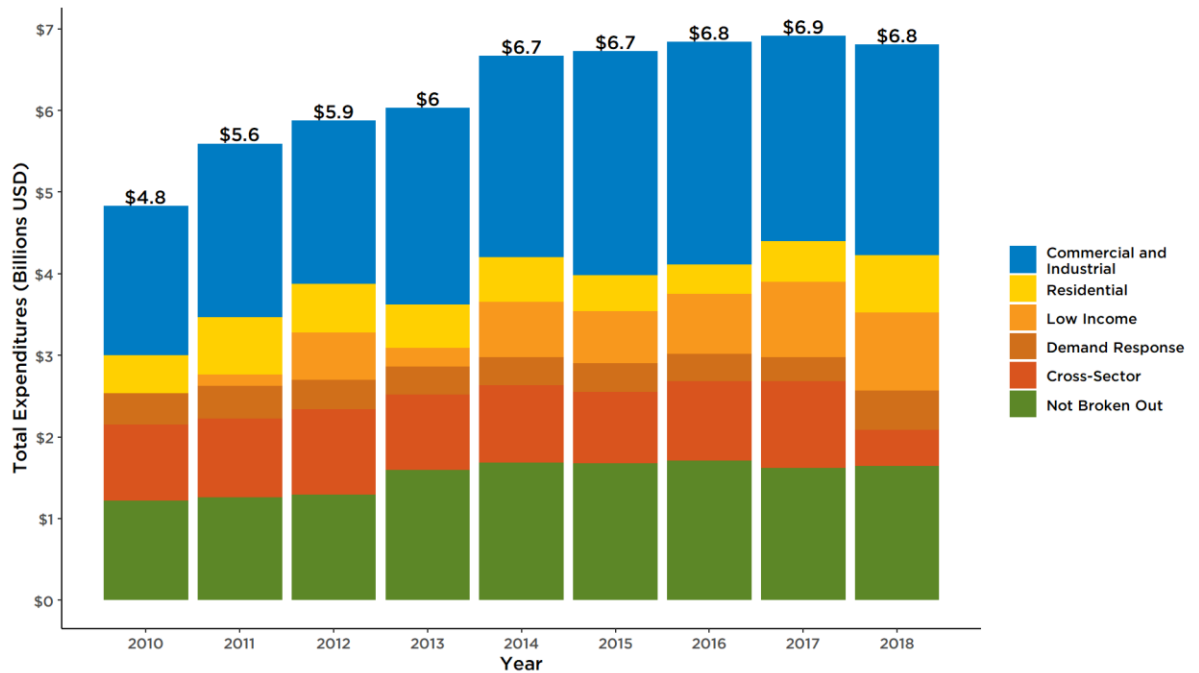


Figure 5 provides a more granular breakdown of 2018 US electric expenditures from all sources by customer class, with the “not broken out” class removed and with commercial and industrial spending separated into commercial, industrial, and C&I classes. Continuing the trend from previous years, the data illustrate that commercial and industrial efficiency programs

<sup>31</sup> In 2017, \$6.4 billion of the total expenditures were derived solely from ratepayer funds. When adjusted for inflation, this represents a decrease of one percent compared to the proportion of expenditures from ratepayers in 2016. In 2016, 95.1 percent of expenditures came from ratepayer funds, and in 2017, 92.7 percent of expenditures were derived from ratepayer funds.

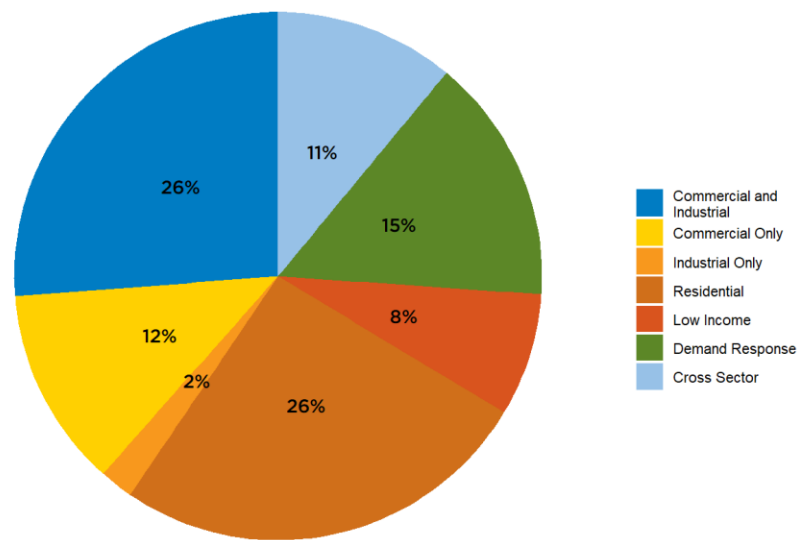
<sup>32</sup> Inflation adjusted figures were based on the “CPI Inflation Calculator,” Bureau of Labor Statistics, accessed May 2020, [https://www.bls.gov/data/inflation\\_calculator.htm](https://www.bls.gov/data/inflation_calculator.htm).

<sup>33</sup> Please note that the "not broken out" class was added in 2011 to capture any expenditure figures that could not be allocated to individual customer classes, which in some cases includes overall portfolio activities such as EM&V or administration and marketing.



received the largest share of electric program funding in the United States, comprising 40 percent of 2018 US electric DSM expenditures, a slight decrease in comparison to the 42 percent of 2017 US electric DSM expenditures these sectors constituted. The residential sector received the second largest share of 2018 DSM electric expenditures, 26 percent, also relatively consistent with 2017. Demand response maintained a sizable portion of expenditures at 15 percent, less than one percent difference from 2017. The remainder of spending was made up of cross sector, at eleven percent, and low income programs, eight percent.

Figure 5. 2018 US Electric DSM Expenditures by Customer Class



CEE also collected information on expenditure (cost) categories for electric energy efficiency programs, as depicted in 0.

Figure 6. 2018 US Electric Energy Efficiency Expenditures by Category

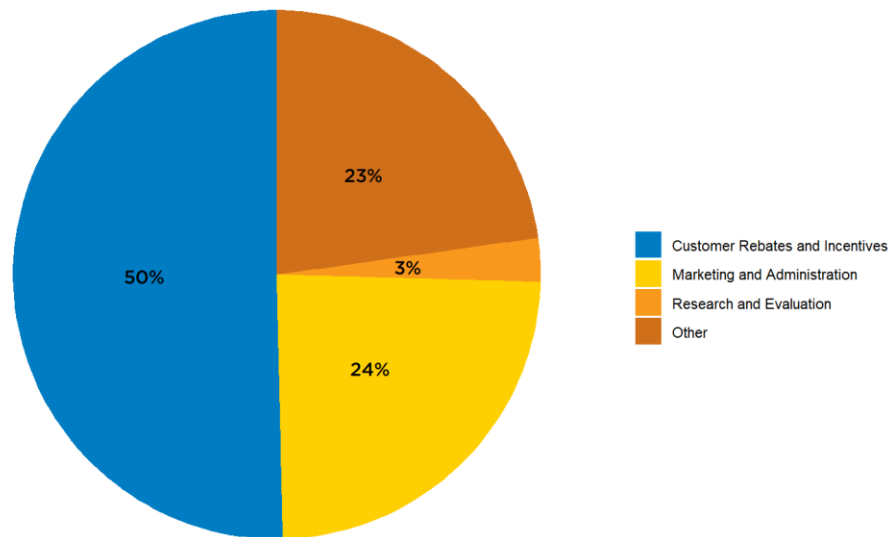


Figure 6 provides an overview of how US program administrators currently allocate electric energy efficiency program expenses, regardless of the targeted customer class. As in the past five years, customer rebate and incentive costs, sometimes classified as direct program costs, represented the largest share of US electric energy efficiency expenditures in 2018. The "other" category contains all funds that US program administrators could not separate into one of the other three categories. Marketing and administration costs—often referred to as indirect program costs—represented 24 percent of 2018 energy efficiency program expenditures in the United States, a three percent increase in proportion than in 2018.

### 3.5.2 United States Program Level Electric DSM Expenditures

Since 2013, CEE has incorporated questions into the US electric survey that ask respondents to report budgets, expenditures, and impact data at the program level when possible<sup>34</sup> (please refer to Section 2.5 for more details on program types). By collecting electric expenditures by program category, CEE

<sup>34</sup> Only electric respondents were asked to break their program expenditures down by the provided program typology. CEE will continue to work with members and with AGA in the future to determine whether this approach is feasible for the gas program administrators surveyed.

intends to track and provide information to help better understand changes or trends in program offerings.

The data in this report represent 197 US electric program administrators, 90 of which provided energy efficiency or demand response expenditures directly in the survey for the program types listed. When data reported for these program types are aggregated by customer class, they indicate an expenditure breakdown similar to that in Figure 5, which represents all 2018 expenditure data reported in the 2019 survey and includes expenditures from the remaining electric DSM program administrators that did not break out their information at the program level. Therefore, we conclude that the programmatic energy efficiency data we obtained in 2019 are representative of overall US electric expenditure trends.

Figure 7 lists the most common energy efficiency program types in terms of expenditures; these programs represent just over 40 percent of all the programmatic energy efficiency expenditures reported by respondents. Demand response program expenditures are not listed in this report but are discussed in general in Electric Demand Response Program Expenditures.

Figure 7. **Most Common US Electric Energy Efficiency Program Types by 2018 Expenditures**

Customer Class	Program Type	2018 Expenditures
Commercial and Industrial	Mixed Offerings	\$499,665,375
Low Income	-	\$494,850,178
Commercial & Industrial	Custom	\$425,433,244
Commercial & Industrial	Prescriptive	\$308,933,256
Residential	Consumer Product Rebate – Lighting	\$302,463,892
Commercial & Industrial	Prescriptive – Lighting	\$199,902,643
Residential	Whole Home – Retrofit	\$176,402,207

Figure 7 continues to show that Commercial and Industrial Mixed Offerings program remain the most commonly funded program types, consistent with the previous four years. Prescriptive and custom programs in the commercial and industrial classes also constitute a significant portion of the program category expenditures provided, as do low income and residential lighting programs. For a full disclosure of the US electric energy efficiency program

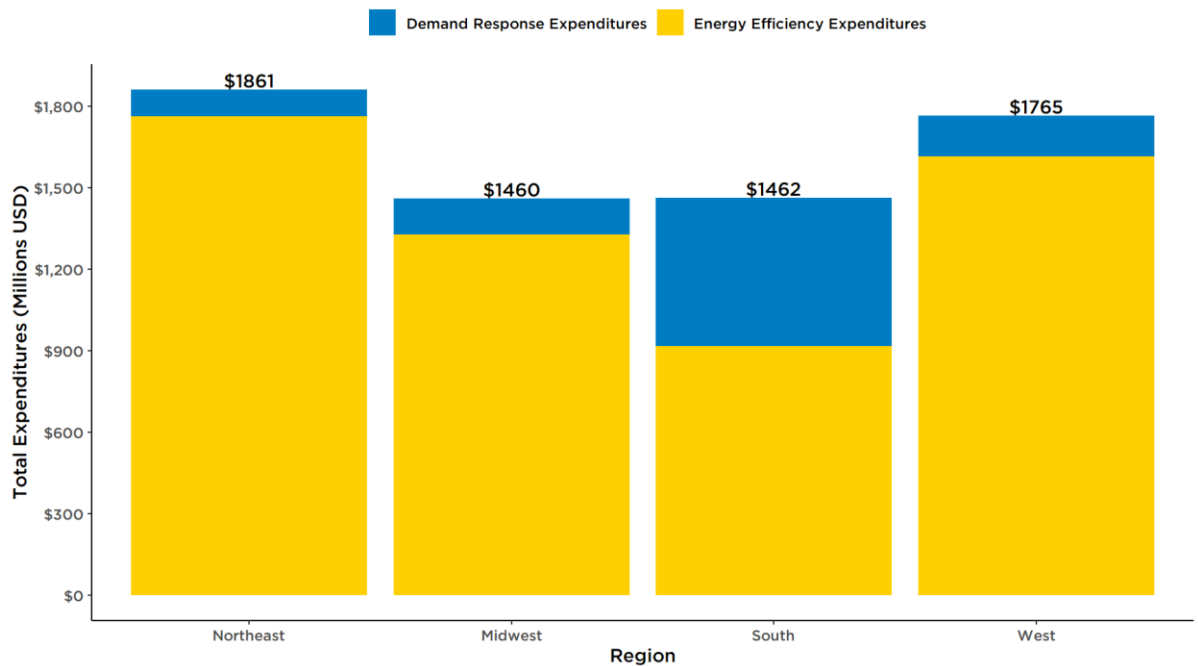
expenditures provided by survey respondents, please refer to List of US and Canadian Electric Energy Efficiency Program Category Expenditures.

### 3.5.3 United States Electric Demand Response Expenditures

Consistent with 2017, approximately 51 percent of electric program administrators who reported 2018 energy efficiency program expenditures also provided demand response expenditures, which again suggests that the majority of US electric survey respondents administer both energy efficiency and demand response programs. Demand response expenditures represent 15 percent of US electric DSM expenditures in 2018 (see Figure 5), about the same percentage as in 2016 and 2017 (less by one percent). Demand response expenditures increased by eight percent compared to 2017 in nominal dollars, ten percent when accounting for inflation.

Figure 8 below provides a regional snapshot of DSM expenditures in the United States in 2018, separated into energy efficiency and demand response.

Figure 8. **US Electric Energy Efficiency and Demand Response Expenditures by Region, 2018**



Consistent with previous years, the South and West continue to lead in demand response expenditures. Data indicate that the South represents the highest proportion of demand response expenditures in 2018 (59 percent), followed by the West (16 percent), Midwest (14 percent) and Northeast (11

percent). This regional breakdown is similar to 2017, but the proportion is skewed even more to the west.. The Northeast (33% increase, from \$73 million to \$97 million), South (28% increase, from \$428 million to \$546 million), and Midwest (26%, from \$105 million to \$132 million) saw increases in overall demand response spending from 2017, while the West decreased (53% decrease, from \$316 million to \$149 million).

In 2013, CEE modified the demand response program categories to align with those used by FERC. (See Section 2.4 for more information.) FERC defines several demand response program types and groups them into two major categories: "incentive-based" programs and "time-based" programs. Electric Demand Response Program Expenditures contains charts and supporting information regarding these two categories of demand response programs.

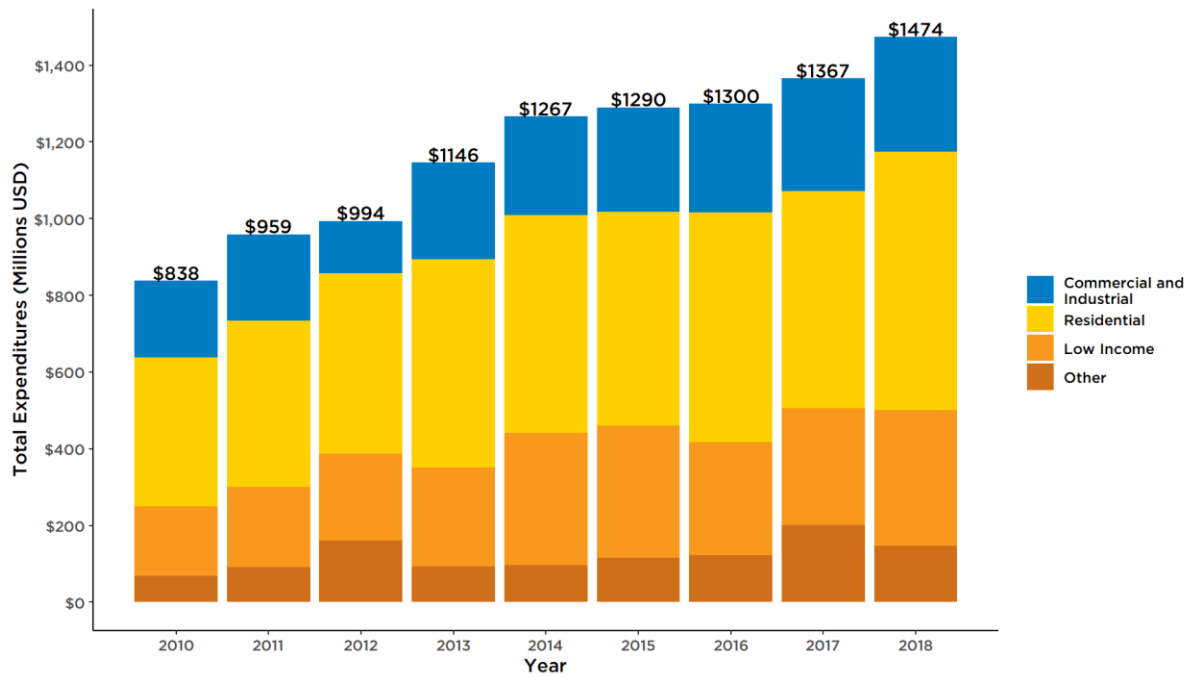
#### 3.5.4 United States Natural Gas Trends

This section discusses natural gas energy efficiency program expenditures in the United States.<sup>35</sup> 0 shows that gas program expenditures for energy efficiency programs in the United States increased eight percent between 2017 and 2018. US gas program administrators spent \$1.474 billion on natural gas efficiency programs in 2018, a ten percent increase compared to 2017 after accounting for inflation. This represents a 38 percent increase over 2013 when adjusted for inflation.

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<sup>35</sup> Please note that natural gas programs are only energy efficiency programs. Natural gas demand response programs do not exist within the industry.

Figure 9. US Natural Gas Expenditures 2010-2018

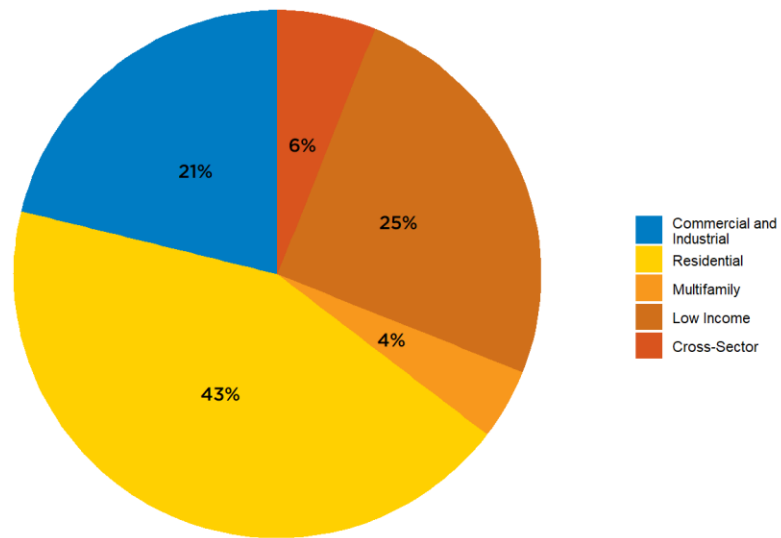


0 presents the magnitude of expenditures from 2010 to 2018 by customer class.<sup>36</sup> The customer class breakdown of 2018 natural gas expenditures is similar to that of 2017 expenditures for most categories.

0 provides a more granular breakdown of 2018 US gas expenditure by customer class. For ease of comparison with previous reports and with a concurrent report by AGA, we did not break commercial and industrial into separate classes in Figures 9 and 10, but multifamily expenditures are separated from residential expenditures in 0. Residential programs continue to represent the largest share of expenditures in 2018 at 43 percent, an increase of seven percent as compared to 2017. Low income and C&I programs follow, accounting for 25 percent and 21 percent of expenditures respectively. Cross-sector expenditures represented six percent and multifamily expenditures four percent of total expenditures.

<sup>36</sup> For ease of year-to-year comparison, note that 0 combines the commercial and industrial customer classes into one commercial and industrial category, as well as the residential and multifamily customer classes into one residential category, for 2010 through 2018.

Figure 10. 2018 US Natural Gas Expenditures by Customer Class

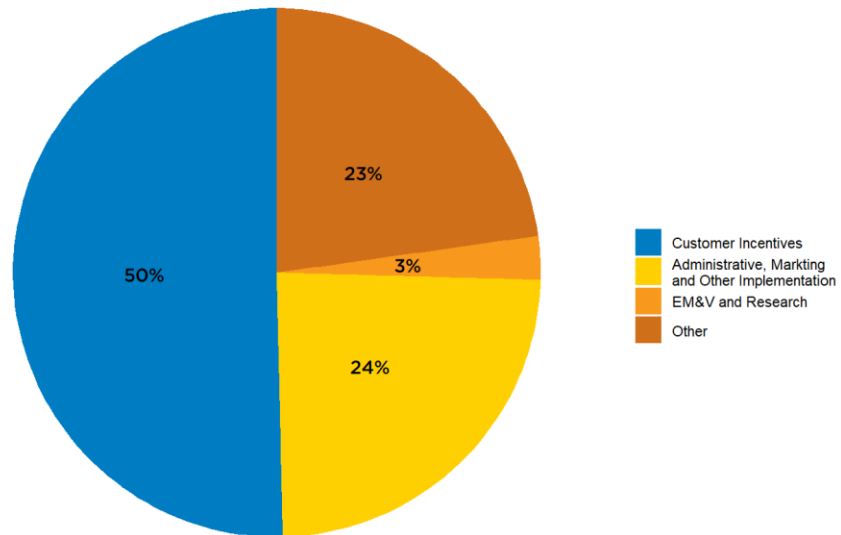


0 separates 2018 gas expenditures in the United States into expenditure categories, which are slightly different from the categories used for US electric programs.<sup>37</sup>

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<sup>37</sup> The electric and gas surveys request this information in ways that are similar, though not identical.

Figure 11. 2018 US Natural Gas Expenditures by Category



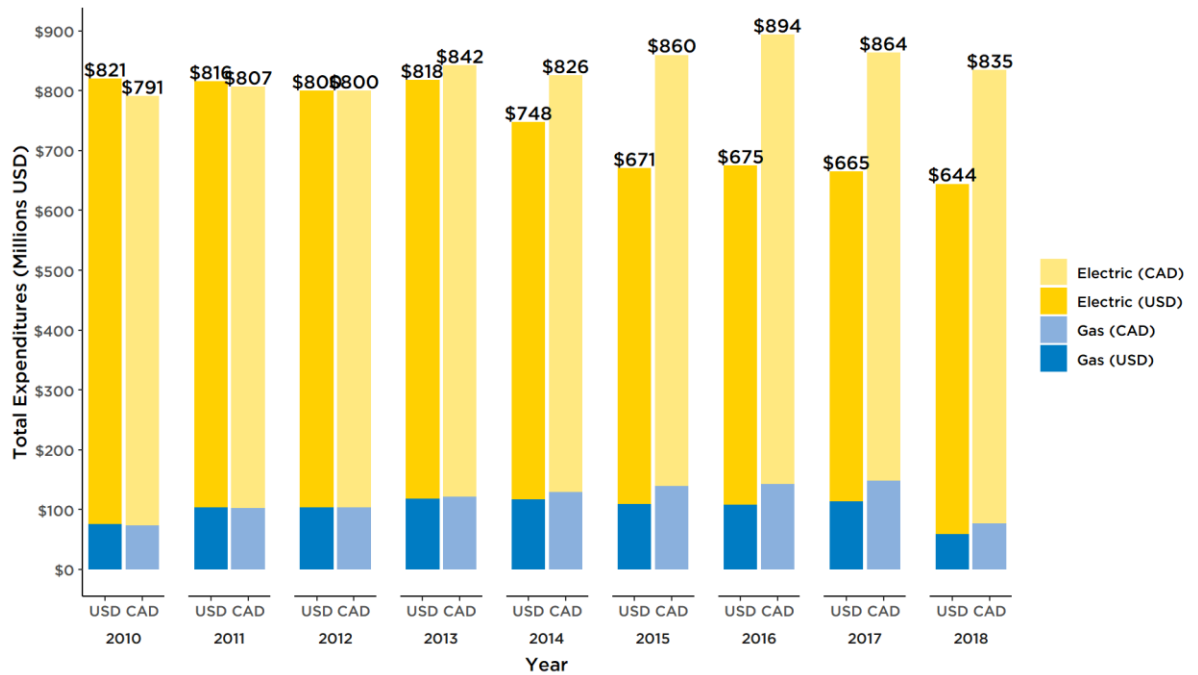
As in 2017, customer incentives represented around half of expenditures in 2018 (50 percent) followed by administrative, marketing, and other implementation spending (24 percent). Research, evaluation, measurement, and verification accounted for three percent of the spending, while "other" expenditures accounted for 23 percent of spending. The "other" category contains all funds that could not be separated into the three specific categories, the proportion of funds identified as "Other" increased by 19 percent from 2017.



### 3.6 Canadian DSM Trends

In 2018, Canadian DSM expenditures reached to \$644 million USD. This represents a slight decrease in overall spending of roughly three percent. 2018 also saw a decrease in CAD expenditures from \$864 million in 2016 to \$835 million in 2018. In USD, this represents a three percent decrease in expenditures as compared to 2017, and a decrease of one percent after adjusting for inflation.<sup>38</sup> In CAD, 2018 represents a three percent decrease in expenditures as compared to 2017, or one percent when adjusting for inflation. Figure 12 below presents Canadian DSM expenditures—including both energy efficiency and demand response programs—from 2010 to 2018 in nominal US and Canadian dollars. Overall, Figure 12 illustrates stable investment by Canadian gas and electric DSM program administrators over the last five years.

Figure 12. Canadian DSM Expenditures—Gas and Electric Combined (2010–2018)



<sup>38</sup> All but one Canadian program administrators reported 100 percent ratepayer funded expenditures in the 2018 survey.

The \$835 million CAD spent by Canadian DSM program administrators represents 0.02 percent of 2018 Canadian Gross Domestic Product and two percent of value added by the Canadian utility industry in 2017.<sup>39</sup>

In 2019, reporting natural gas and electric DSM program administrators in Canada budgeted nearly \$510 million, or roughly \$738 million CAD, to energy efficiency and demand response programs. In USD, this represents an 40 percent decrease over 2018 DSM budgets in inflation-adjusted USD.

### 3.6.1 Canadian Electric DSM Trends

CEE reports electric DSM trends by customer class and, as discussed in previous sections, asks survey respondents to report budgets, expenditures, and impact data at the program level when possible.<sup>40</sup> Respondents who were able to provide these data were asked to select a specific program type for each program (see Section 2.4 and Electric Energy Efficiency Program Categories for more information); CEE then aggregates these data in order to report figures for customer class comparisons.

Canadian electric DSM expenditures totaled nearly \$585 million USD (\$759 million CAD) in 2018, as shown in 0<sup>41</sup> below.

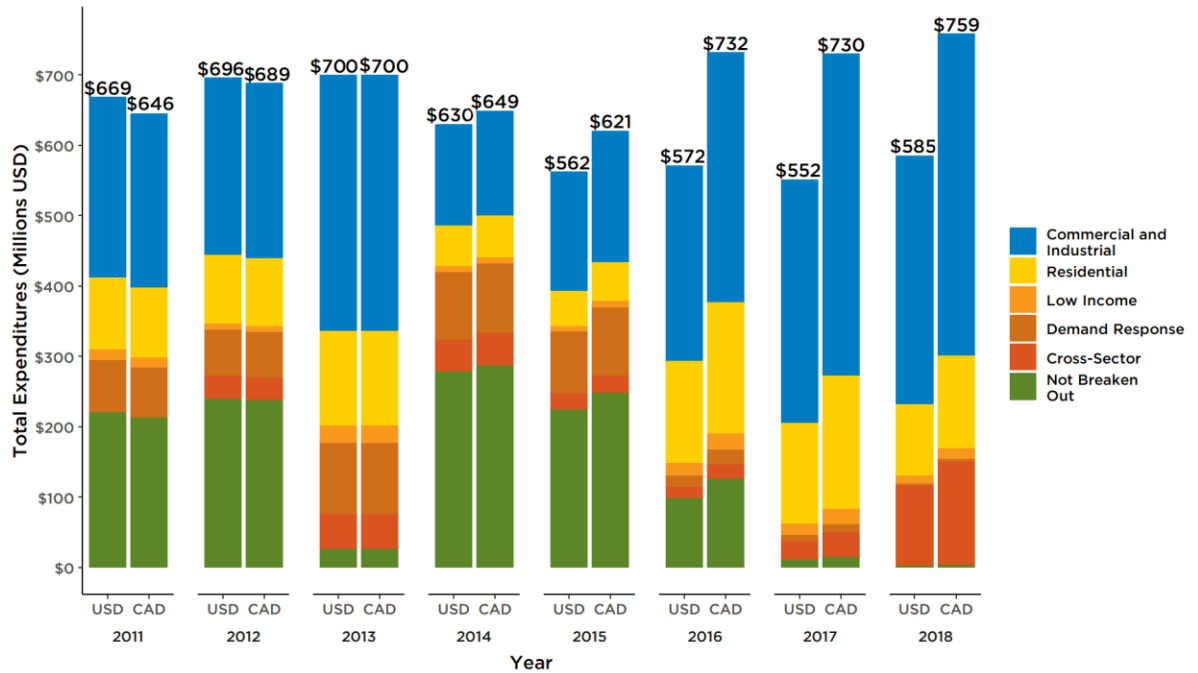
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<sup>39</sup> Comparisons in this paragraph are based on data from Statistics Canada: Statistics Canada. *Table 379-0031 Gross Domestic Product (GDP) at basic prices, by North American Industry Classification System (NAICS), Monthly* (table). CANSIM (database). Last updated April 20, 2020. <https://www150.statcan.gc.ca/t1/tb11/en/cv.action?pid=3610043401#timeframe>. (accessed April 20, 2020).

<sup>40</sup> Only electric respondents were asked to break their program expenditures down by the provided program typology. CEE will continue to work with members and with AGA in the future to determine whether this approach is feasible for the gas program administrators surveyed.

<sup>41</sup> 0 combines the 2018 customer classes of commercial, industrial, and C&I into the “commercial and industrial” category. Where possible, these categories are separated out in Figure 14.

Figure 13. Canadian Electric DSM Expenditures 2010-2018



The \$759 million CAD spent on electric DSM programs in Canada in 2018 represent a four percent increase from 2018 expenditures, also a seven percent increase when adjusting for inflation. 2018 shows a consistent trend in sector level trends. This includes the continued downward trend in demand response expenditures, which again decreased substantially. This change was attributed to one large program administrator who reported a significant reduction in their demand response spending in 2017, a result of switching their demand response programs to the capacity markets.

In 2011, CEE added the "not broken out" class to capture any expenditures program administrators could not allocate to individual customer classes,<sup>42</sup> which in some cases includes overall portfolio activities such as EM&V or administration and marketing. Expenditures for 2014, and 2015 allocated to the "not broken out" category were high due to at least one large program administrator not responding in those survey years. In these cases, CEE carried through the previous years' total expenditures as to develop a "straight line" estimate instead of letting their expenditures drop to zero. The prior expenditures for such program administrators were carried into the respective survey year's data as an estimate in the "not broken out" category.

<sup>42</sup> See Section 2.4 above for more detail about the collection and differentiation of budgets, expenditures, and savings in the 2019 survey.

However, in both 2017 and 2018 this program administrator was able to respond to the survey, showing a significant reduction in expenditures reported as “not broken out” and allocated other sector-level categories.

Figure 14 below depicts 2018 Canadian electric DSM expenditures on a more granular level, broken out by customer class and excluding the "not broken out" category. Commercial and Industrial expenditures continue to constitute the largest proportion of spending in Canada in 2018, but the proportion of industrial programs has increased relative to 2016 and 2017 rates. Cross-sector represent the second highest proportion of total Canadian electric DSM spending at 17 percent and increase from the five percent observed in 2017. Residential programs represented the second highest proportion of total Canadian electric DSM spending in 2017, but in 2018 the proportion of residential expenditures decreased from 26 percent to 15 percent.

Figure 14. 2018 Canadian Electric DSM Expenditures by Customer Class

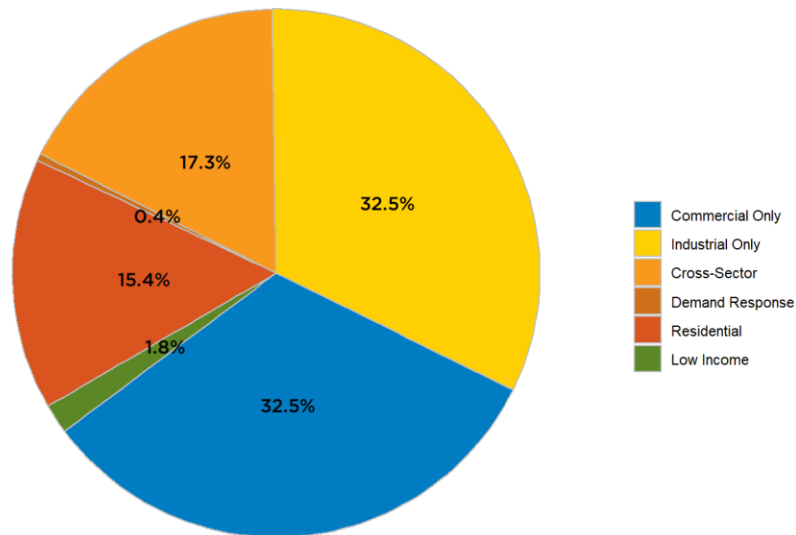
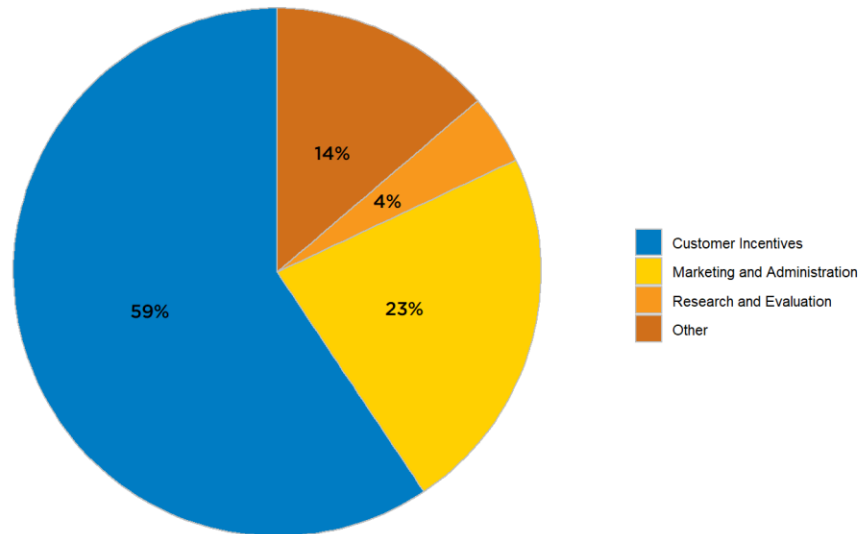


Figure 15 presents the classification of 2018 electric energy efficiency expenditures in Canada by cost category. Customer rebates and incentives represented just over half (59 percent) of 2018 expenditures, followed by marketing and administration (23 percent) and research and evaluation (four percent). The “other” category, which contains all funds that could not be

separated into the previous three categories, represented 14 percent. This breakdown is very similar to 2017 ratios, except for the “other” category, which increased from five percent to the present 14 percent.

Figure 15. **2018 Canadian Electric Energy Efficiency Expenditures by Category**



### 3.6.2 Canadian Program Level Electric DSM Expenditures

Although not depicted in Figure 15 above, in 2019 Canadian program administrators budgeted \$481 million (over \$643 million CAD) for electric DSM programs. This represents a 35 percent decrease from 2018 budgets.

Since 2013, CEE has collected program administrator information in more granular categories for each electric customer class in order to begin to better understand what types of electric programs, and possibly what products and systems, are most common in the industry. CEE has incorporated questions into the electric survey that ask respondents to report budgets, expenditures, and impacts data at the program level if possible<sup>43</sup> (please refer to Section 2.4 for more details on program categories). These data, aggregated to customer

<sup>43</sup> CEE incorporated program level questions for the electric survey only. CEE will continue to work with our members and with AGA in the future to determine whether this approach is feasible for the gas program administrators surveyed.

class, indicate a breakdown similar to that in Figure 14, as all Canadian electric program administrators were able to provide program level data in this year's survey. Therefore, we conclude that the program level data we obtained in 2019 are representative of overall Canadian electric energy efficiency expenditure trends.

Figure 16 lists the most common energy efficiency program types in terms of expenditures, excluding program funding categorized as "other." Demand response program level expenditures are not listed in this report but are discussed in general in Electric Demand Response Program Expenditures.

Figure 16. **Most Common Canadian Electric Energy Efficiency Program Types by 2018 Expenditures**

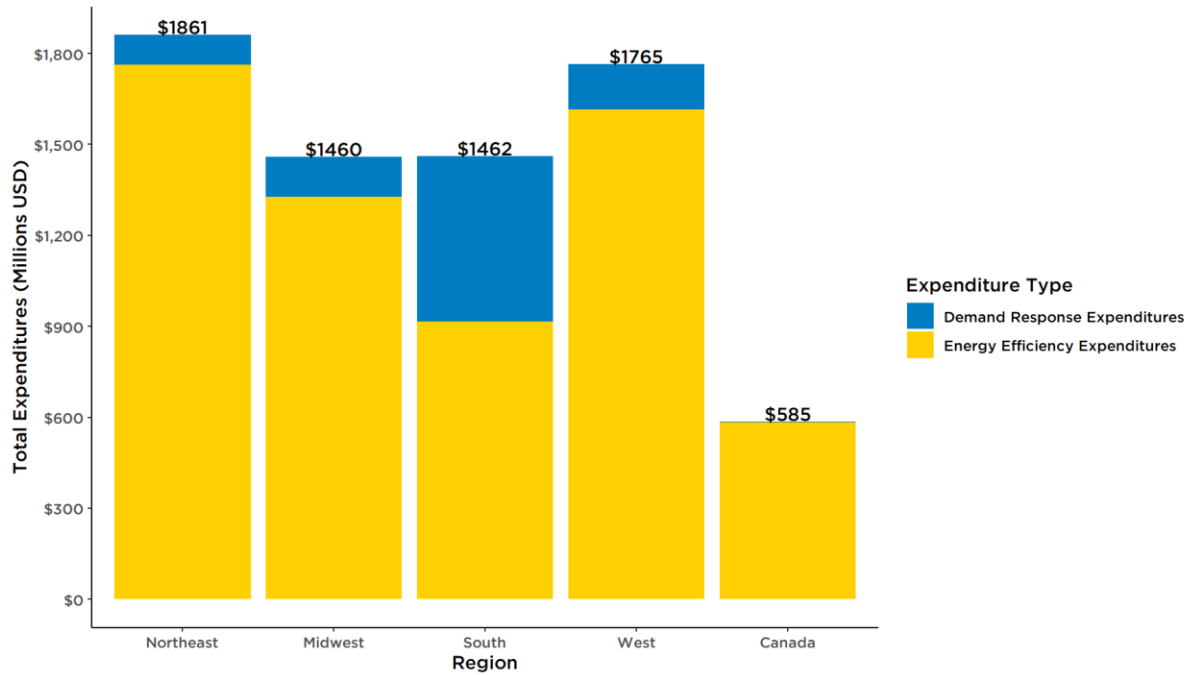
Customer Class	Program Type	2018 Expenditures (USD)	2018 Expenditures (CAD)
Commercial & Industrial	Prescriptive – Lighting	\$ 96,761,915	\$ 125,632,768
Residential	Consumer Product Rebate for Lighting	\$ 87,705,838	\$ 113,874,629
Commercial & Industrial	Custom – Retrocommissioning	\$65,980,440	\$85,667,024
Commercial & Industrial	Custom – Industrial or Agriculture Processes	\$ 54,428,048	\$ 70,667,744
Commercial & Industrial	Small Commercial - Prescriptive	\$ 37,940,791	\$ 49,261,185

For a full disclosure of the Canadian electric energy efficiency program expenditures provided by survey respondents, please refer to List of US and Canadian Electric Energy Efficiency Program Category Expenditures.

### 3.6.3 Canadian Electric Demand Response

The Canadian electric program administrators that responded to this survey spent just under \$3 million USD, or around \$3.7 million CAD, on their demand response programs in 2018, representing a 68 percent decrease in USD expenditures as compared to 2017. Demand response accounted for less than 0.1 percent of total Canadian electric DSM expenditures (see Figure 14).

Figure 17. US and Canadian Electric DSM Expenditures by Region, 2018



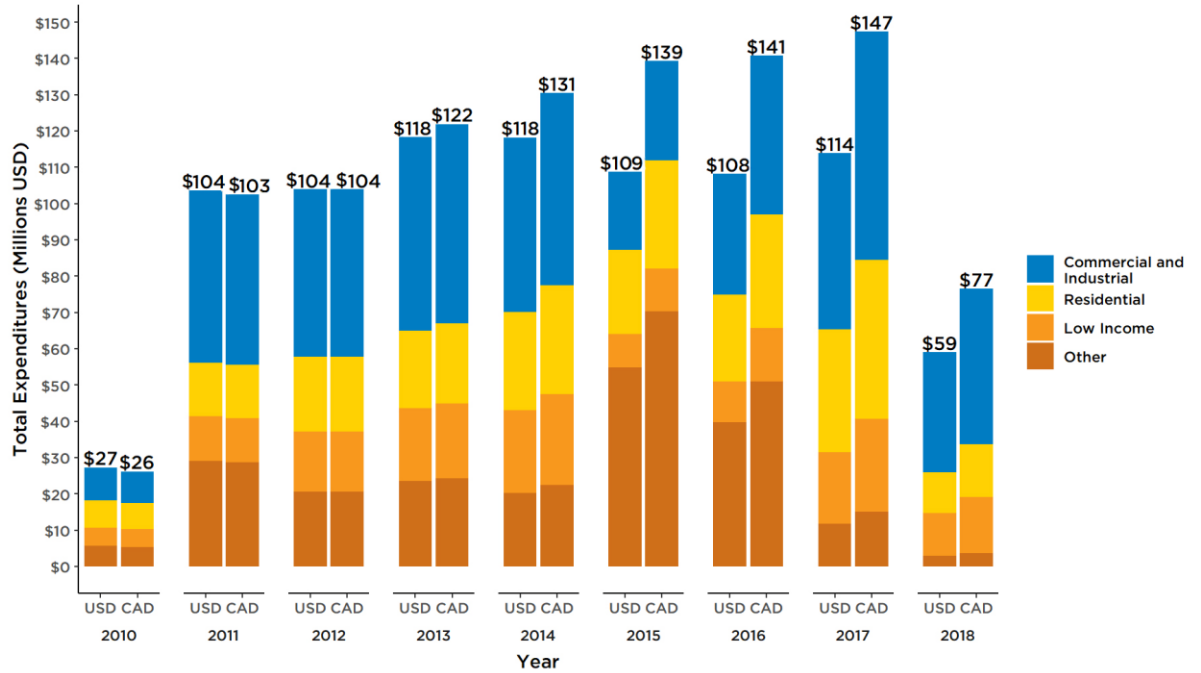
Similar to the 2018 report, Canadian demand response expenditures could not be broken out by program type in this year. See Electric Demand Response Program Expenditures for more information.<sup>44</sup>

### 3.6.4 Canadian Natural Gas Trends

In 2018, Canadian natural gas program expenditures (in CAD) decreased by almost fifty percent compared to 2017 expenditures. 0 indicates that Canadian program administrators reported 2018 expenditures of \$59 million USD, or \$77, million CAD.

<sup>44</sup> In 2013, CEE modified the demand response program categories to align with those used by FERC. (See Section 2.4 for more information.)

Figure 18. Canadian Natural Gas Expenditures 2010-2018

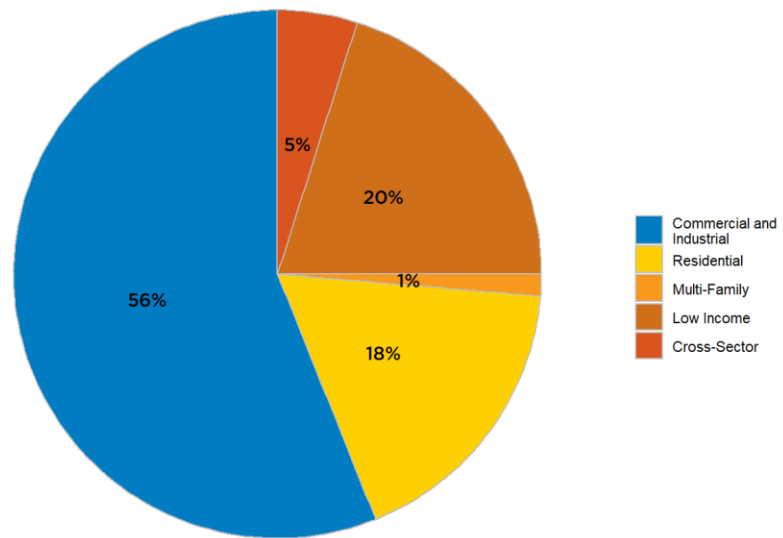


For ease of comparison between years, note that for 2013 onwards 0 combines the commercial and industrial sectors into one “commercial and industrial” customer class and the residential and multifamily sectors into one “residential” customer class, as these categories weren’t broken out prior to 2013.

0 shows that commercial and industrial programs continue to account for the largest share of Canadian natural gas efficiency program expenditures in 2018 (56 percent), followed by low income (20 percent), and residential programs (18). For ease of comparison with previous years' reports and with a concurrent report by AGA, we did not break commercial and industrial into separate classes in 0 and0, but multifamily expenditures are separated from residential expenditures in 0.



Figure 19. 2018 Canadian Natural Gas Expenditures by Customer Class

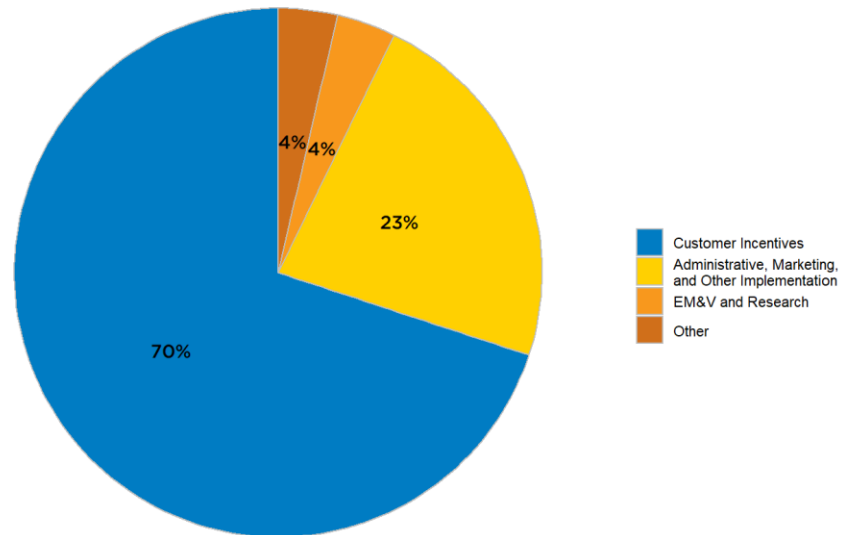


In 0, Canadian gas expenditure data are broken out into slightly different cost categories than those used in the electric data sections of this report.<sup>45</sup>

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<sup>45</sup> The electric and gas surveys request this information in ways that are similar, though not identical.

Figure 20. 2018 Canadian Natural Gas Expenditures by Category



As in previous reports, the year-to-year category breakdown of Canadian natural gas expenditures remained similar, with customer incentives representing roughly two-thirds of expenditures in 2018 (70 percent, up four percent from 2017). This increase was offset largely by a slight decrease in administrative, marketing, and other implementation (from 28 percent in 2017 to 23 percent in 2018). Research, evaluation, measurement, and verification expenditures, and expenditures in the “other” category accounted for four percent of spending each.

Canadian natural gas program administrators budgeted more \$73 million (approximately \$95 million CAD) for programs in 2019, which is a decrease of 48 percent as compared to 2018 budgets in nominal dollars.

## 4 Evaluation, Measurement and Verification

CEE, along with AGA, asked survey respondents to report spending on research and EM&V in 2018. Respondents to the electric survey were asked to provide the percentage of their total 2018 energy efficiency expenditures allocated to EM&V, whereas respondents to the gas survey were asked to

provide the dollar amount.<sup>46</sup> Figures 21 and 22 below present the 2018 EM&V expenditures for electric and gas energy efficiency programs in the United States and Canada.<sup>47</sup>

Figure 21. **US and Canadian Electric EM&V Expenditures**

<b>Country</b>	<b>2018 EM&amp;V Expenditures (Millions USD)</b>	<b>Total 2018 Energy Efficiency Expenditures (Millions USD)</b>	<b>EM&amp;V % of Total Expenditures</b>
United States	156	5,843	3%
Canada	32	583	5%
Total	188	6,426	3%

*Note:* This table includes estimates of EM&V expenditures for electric EE programs that were derived by multiplying total reported expenditures (from all sources) by an EM&V percentage reported by respondents. Total 2018 expenditures only include data from those respondents who provided a percentage breakout of expenditures by category and are therefore smaller than total EE expenditures listed earlier in the report.

Figure 22. **US and Canadian Natural Gas EM&V Expenditures**

<b>Country</b>	<b>2017 EM&amp;V Expenditures (Millions USD)</b>	<b>Total 2016 Energy Efficiency Expenditures (Millions USD)</b>	<b>EM&amp;V % of Total Expenditures</b>
United States	32	1,412	2%
Canada	2	59	4%
Total	34	1,471	2%

Not all respondents allocate funding for evaluation purposes on an annual basis, and some respondents simply did not respond to this portion of the survey. Among those program administrators that broke out their energy efficiency expenditures by category, 60 percent of US and Canadian electric energy efficiency program administrators and 66 percent of US and Canadian gas program administrators indicated 2018 EM&V expenditures. EM&V expenditures comprised between two and four percent of 2018 energy efficiency expenditures in the United States and Canada, which is roughly

<sup>46</sup> As in the past four years, electric EM&V expenditures in this report exclude demand response.

<sup>47</sup> Please note, however, that the total electric expenditures in these figures only include data from program administrators who provided expenditure breakouts by category, so they may be smaller than the expenditure totals presented earlier in this report.

consistent with the proportions of between two and five percent reported in both 2016 and 2017.<sup>48</sup>

Since programs and their evaluation procedures do not necessarily occur at the same time, CEE urges caution when comparing program expenditures to expenditures allocated for EM&V activities in any given year.

## 5 Estimated Program Savings and Environmental Impacts

CEE collected data on energy efficiency savings from gas and electric program administrators in 2018. In order to help respondents report their savings consistently across states and provinces, CEE used the Energy Information Administration (EIA) definitions of incremental savings. According to EIA Form EIA-861, incremental savings include all energy savings that accumulated in 2018 from new 2018 participants in existing energy efficiency programs and from all participants in new 2018 programs.

CEE collected two different categories of savings values in the survey: net incremental savings and gross incremental savings.<sup>49,50</sup> In keeping with previous reports, this report focuses on gross incremental savings. We emphasize gross incremental savings because they are the most widely tracked savings in the industry. Gross incremental savings are also the most comparable across the United States and Canada because they contain the fewest assumptions embedded in them. In addition, gross savings provide the most useful metric for energy system planners because they include all the savings that occur, regardless of whether they were directly caused by the

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<sup>48</sup> "Energy Efficiency Program Impact Evaluation Guide," State and Local Energy Efficiency Action Network, State & Local Energy Efficiency Action Network's Evaluation, Measurement, and Verification Working Group, last modified December, 2012, [https://www4.eere.energy.gov/seeaction/system/files/documents/emv\\_ee\\_program\\_impact\\_guide\\_0.pdf](https://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf), 7-14.

<sup>49</sup> Gross savings generally include all savings claimed by a program, regardless of the reason for participation in the program.

<sup>50</sup> Net savings exclude whatever is typically excluded in the jurisdictions of reporting organizations. This often includes, but is not limited to, free riders, savings due to government mandated codes and standards, and the "natural operations of the marketplace," such as reduced use because of higher prices and fluctuations in weather or business cycles. Also depending on the jurisdiction, net savings sometimes incorporate additional savings resulting from spillover and market effects, which may outweigh the factors noted above and result in values that are greater than gross savings.

particular program being evaluated. On the other hand, evaluators and regulators often use net savings to measure against savings goals or to plan subsequent programs because they include only those savings that resulted directly from the program under evaluation. In all tables, CEE intended to only aggregate gross savings figures, but because program administrators do not always report gross savings values in the survey, CEE uses net savings where gross savings were not available.<sup>51</sup>

Although CEE worked with survey respondents to ensure they reported savings data as consistently as possible, many organizations calculate and report savings according to requirements in their states or provinces, which may not align exactly with EIA definitions. Not all organizations adjust their estimates to reflect EIA definitions. Finally, due to the timing of the request and differing evaluation cycles across organizations and jurisdictions, savings were often reported prior to evaluation and are subject to change.

#### 5.1.1 Ratepayer Funded Electric Energy Efficiency Program Savings

Ratepayer funded energy efficiency programs save energy and reduce the amount of greenhouse gases emitted in the United States and Canada. As such, energy efficiency is well positioned as a cost-effective tool for meeting carbon dioxide reduction targets at both the state and national level. Reporting electric efficiency programs in the United States and Canada estimated incremental electricity savings of approximately 36,101 GWh in 2018 (see Figure 23). This is equivalent to over 25.5 million metric tons of avoided CO<sub>2</sub> emissions.<sup>52</sup>

As noted in Section 2.2 above, this report focused only on ratepayer funded programs in previous years. Since 2013, CEE and our collaborators have collected information on electric programs derived from all funding sources in order to provide a more comprehensive picture of the DSM industry. Figure 23 and 0 below show all electric energy efficiency savings by sector

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<sup>51</sup> CEE worked closely with our collaborator AGA to collect savings information from survey participants. This includes collection of "annual" savings, which are incremental savings plus savings in the current year from measures that were implemented in previous years but are expected to still achieve savings. In some cases, AGA has elected to emphasize different savings data collected jointly through this effort than what CEE has chosen to emphasize. For more information on what AGA has published specifically and why, please refer to the reports that are publicly available on their website.

<sup>52</sup> Calculated using the EPA Greenhouse Gas Equivalencies Calculator, [epa.gov/energy/greenhouse-gas-equivalencies-calculator](https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator). April 2019.

and totals for both ratepayer funded programs and for programs that received funding from other sources.

Figure 23. **US and Canadian Gross Incremental Electric Energy Efficiency Savings, 2018(GWh): Ratepayer and All Sources Totals\***

	Residential	Low Income	C & I	Other	No Breakout	Ratepayer Total	All Sources Total
<b>United States**</b>							
Northeast	1,254	70	1,483	55	504	3,086	3,565
Midwest	2,215	78	3,314	62	6,004	11,673	11,673
South	2,164	94	3,222	43	217	5,728	5,797
West	1,034	5	1,325	1,353	9,926	13,251	13,710
<b>US Subtotal</b>	<b>6,668</b>	<b>246</b>	<b>9,343</b>	<b>1,514</b>	<b>16,652</b>	<b>33,738</b>	<b>34,746</b>
<b>Canada***</b>	<b>74</b>	<b>3</b>	<b>65</b>	<b>0</b>	<b>1,213</b>	<b>1,355</b>	<b>1,355</b>
<b>Binational Total</b>	<b>6,742</b>	<b>249</b>	<b>9,409</b>	<b>1,514</b>	<b>17,865</b>	<b>35,093</b>	<b>6,742</b>

\* Based on estimated total of all energy savings that accumulated from new participants in existing programs and all participants in new programs in 2018.

\*\* Ninety-seven (95) percent of electric survey respondents in the United States that reported EE programs reported a value for incremental energy savings. Of those that reported a value for incremental energy savings, eighty-seven (87) percent reported gross incremental savings. For respondents that did not report gross incremental savings, CEE used net incremental savings in calculating totals.

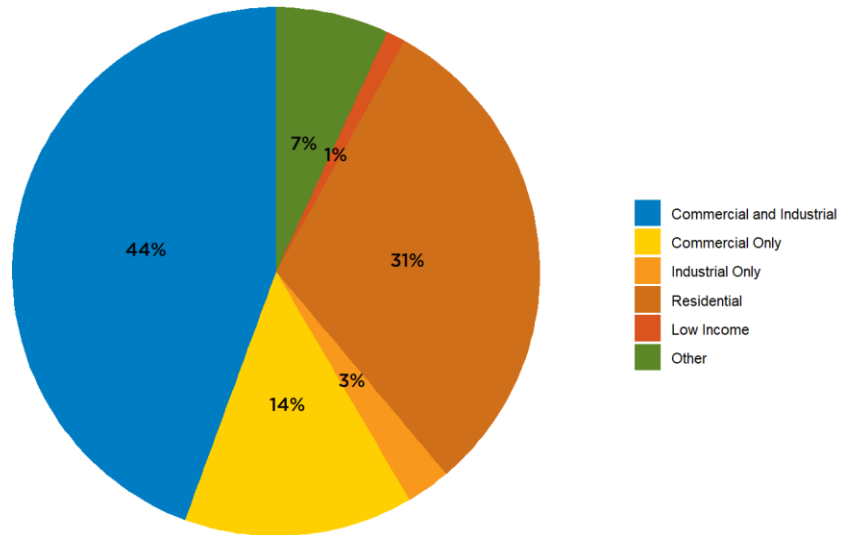
\*\*\* One hundred (100) percent of electric survey respondents in Canada that reported EE programs reported a value for incremental energy savings. Of those that reported a value for incremental energy savings, fifty-seven (57) percent reported gross incremental savings. For respondents that did not report gross incremental savings, CEE used net incremental savings in calculating totals.

Figure 24 shows that across the United States and Canada, commercial and industrial electric programs together accounted for well over half of the total energy savings (61 percent), followed by residential (31 percent), and low income (one percent). This breakdown is similar to that of US and Canadian electric energy efficiency expenditures, with the exception that the low income customer class makes up a smaller percentage of savings (one percent) than of expenditures (eight percent) and that the commercial and industrial customer class makes up a larger percentage of savings (61 percent) than of expenditures (48 percent). These findings are also consistent with the last four years of survey results, reinforcing these relative relationships of savings and expenditures by sector. Low-income programs are generally mandated for the public benefit, and while they may not result in high

savings, they may result in significant benefits for program administrators in the form of reduced arrearages and for customers in the form of lower energy bills and higher disposable income. This likely explains the difference in the proportions of expenditures and savings represented by low income programs.

As noted in Section 2.4, respondents to the survey may interpret the categories differently, and not all respondents broke their information out by customer class. Therefore, Figure 24 represents only those savings reported at the customer class level and does not include the savings reported as "No Breakout" in Figure 23.

Figure 24. **2018 US and Canadian Gross Incremental Electric Energy Efficiency Savings by Customer Class**



Based on the gross incremental savings figure for electric efficiency programs provided in Figure 23 above, in 2018 the value of electric energy efficiency savings across the United States and Canada was over \$3.7 billion.<sup>53,54</sup>

Beginning in 2013, CEE asked respondents to provide estimates of capacity savings from their energy efficiency programs. Capacity savings estimates are depicted below in 0.

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<sup>53</sup> US electric retail values were calculated based on the average retail price of electricity to ultimate customer by end use sector across the United States in 2018 using data from the Electric Power Monthly December 2018 issue, which contains YTD 2017 data. Average electric rates used: \$ 0.1287 per kWh (residential), \$0.1067 (commercial), and \$0.0692 (industrial). The residential retail rate was used for low income program savings. The rate for combined C&I programs was determined by taking the average of the commercial and industrial retail rates. The rate for “other” programs was determined by taking the average of the residential, commercial, and industrial retail rates. “Electric Power Monthly: Table 5.3. Average Price of Electricity to Ultimate Customers,” Energy Information Administration, last modified March 2019, accessed April 2019, [eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_03](http://eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_03).

<sup>54</sup> Canadian electric retail values were calculated based on the average rate per kWh across Canada in 2016 using data from an analysis maintained by Manitoba Hydro titled “Utility Rate Comparisons.” Average electric rates used: \$ 0.1177 CAD per kWh (residential), \$0.1172 CAD per kWh (commercial) and \$0.0783 per kWh (industrial). The residential retail rate was used for low income program savings. The rate for “other” programs was determined by taking the average of the residential and the commercial and industrial retail rates. The residential figure is an average of the rates for 12 major cities in Canada, and commercial and industrial figures an average of those for the associate utilities of those cities and may not reflect the average electricity price for Canada as a whole. “Manitoba Hydro: 2017/18 & 2018/19 General Rate Application,” Manitoba Hydro, accessed March 2018, [https://www.hydro.mb.ca/regulatory\\_affairs/electric/gra\\_2017\\_2019/index.shtml](https://www.hydro.mb.ca/regulatory_affairs/electric/gra_2017_2019/index.shtml).



Figure 25. **2018 US and Canadian Electric EE Gross Incremental\* Capacity Savings (MW)**

	Residential	Low Income	C & I	Other	No Breakout	Ratepayer Total	All Sources Total
<b>United States**</b>							
Northeast	252	15	806	12	8	<b>1,015</b>	<b>1,093</b>
Midwest	369	10	475	9	268	<b>1,131</b>	<b>1,131</b>
South	507	49	627	26	323	<b>1,514</b>	<b>1,532</b>
West	145	0	214	258	571	<b>1,058</b>	<b>1,188</b>
<b>US Subtotal</b>	<b>1,273</b>	<b>74</b>	<b>2,122</b>	<b>305</b>	<b>1,170</b>	<b>4,717</b>	<b>4,944</b>
<b>Canada***</b>	15	1	7	-	200	223	223
<b>Binational Total</b>	<b>1,288</b>	<b>75</b>	<b>2,129</b>	<b>305</b>	<b>1,370</b>	<b>4,941</b>	<b>5,168</b>

\* Based on estimated total of all capacity savings that accumulated from new participants in existing programs and all participants in new programs in 2017.

\*\* Eighty-one (81) percent of electric survey respondents in the United States that reported energy efficiency programs reported a value for incremental capacity savings. Of those that reported a value for incremental energy savings, 88 percent reported gross incremental savings. For respondents that did not report gross incremental savings, CEE used net incremental savings in calculating totals.

\*\*\* Seventy-one (71) percent of respondents in Canada that reported energy efficiency programs reported a value for incremental capacity savings. Of those that reported a value for incremental savings, 60 percent reported gross incremental savings. For respondents that did not report gross incremental savings, CEE used net incremental savings in calculating totals.

Unlike energy savings, which are reported in kilo-, mega-, or gigawatt hours and measure the amount of energy saved over time, capacity savings are measured in kilo-, mega-, or gigawatts and represent reductions in demand forecast to occur at a particular time, generally during hours of peak demand. The capacity savings that result from energy efficiency programs can be very valuable, particularly in areas with constrained transmission capacity or high summer or winter peaks.

### 5.1.2 Electric Demand Response Program Savings

Beginning in 2015, CEE asked demand response program administrators to report the number of events called for each of their demand response programs, the average savings per event, and each program target (summer peak, winter peak, another peak, or “non-peak,” which refers to a target other than a peak). Survey respondents could designate their programs as having

more than one target.<sup>55</sup> Respondents only reported eleven “other peak” programs and eight “non-peak” programs, and the majority of programs in each of these categories were identified as having multiple targets. Thus, the savings for “other peak” and “non-peak” programs reported below are likely overestimates at the expense of summer and winter peak programs. CEE may consider soliciting more information on “other peak” and “non-peak” programs in the future in order to better estimate the associated savings.

For 2018, we report both the total number of events run and average MW savings per event below, grouped by region and program target. As in 2018, in 2019 CEE did not ask respondents for their peak duration and therefore could not calculate total MWh savings from the total savings below. Together, CEE believes the number of events and average MW reductions per event provide a reasonable indicator of program activity in the industry. However, CEE also acknowledges that as demand response activity continues to shift with the evolution of the energy industry, we may need to revisit which metrics are most representative of demand response activity.

Figure 26. **Number of DR Events Called by US and Canadian Electric Program Administrators by Program Target and Region**

	Summer	Winter	Other Peak	No Peak	All
<b>Northeast</b>	-	789	91	-	<b>880</b>
<b>Midwest</b>	5	1,923	606	-	<b>2,534</b>
<b>South</b>	6	2,674	3,781	-	<b>6,461</b>
<b>West</b>	119	2,522	188	306	<b>3,135</b>
<b>Canada</b>	-	-	-	-	-
<b>Total</b>	<b>130</b>	<b>7,908</b>	<b>4,667</b>	<b>306</b>	<b>13,011</b>

As shown in Figure 26, US and Canadian demand response programs called a total of 13,011 events in 2018.<sup>56</sup> The gross total number of events in 2018 far exceeded the number of events recorded in 2017 (in 2017, only 1,630 events were recorded). The large majority of events occurred in the West and South

<sup>55</sup> Note that program target is separate from program type, for example, direct load control. Savings by program type are not analyzed here.

<sup>56</sup> For reference, FERC reported that in 2014 the potential peak reduction from all retail demand response programs in the United States was 31,191 MW. "Demand Response & Advanced Metering Staff Report," Federal Energy Regulatory Commission, [ferc.gov/legal/staff-reports/2016/DR-AM-Report2016.pdf](http://ferc.gov/legal/staff-reports/2016/DR-AM-Report2016.pdf), 14.

regions, with fifty percent of events occurring in the programs in the South and twenty-four percent in the West. Unlike 2017, where over two-thirds of events aimed to address the summer peak, in 2018 sixty-one percent of events occurred during the winter peak, thirty-six percent were said have occurred during a peak other than summer or winter, and only one percent occurred during the summer peak. Please note that CEE asks respondents to include programs run within their service territories and to exclude any programs run solely by or within the wholesale markets.<sup>57</sup>

Figure 27. **US and Canadian Electric Demand Response Average MW Savings by Region and Program Target**

	Summer	Winter	Other Peak	No Peak	MW Subtotals
<b>Northeast</b>	-	-	-	-	-
<b>Midwest</b>	-	-0.1	-	-	0.1
<b>South</b>	8	-	-	-	8
<b>West</b>	255	28	-	0.1	283.1
<b>Canada</b>	-	-	-	-	11
<b>Totals</b>	263	28.1	-	0.1	-

Figure 27 presents average MW savings by region and target. Demand response programs in the United States and Canada saved on average 19 MW per event in 2018.<sup>58</sup> In the United States, the West saved the most on average per event, 10.32 MW. Further, reported summer programs saved the most on average per event, 244 MW.

### 5.1.3 Ratepayer Funded Natural Gas Program Savings

Figure 28 indicates that natural gas efficiency programs in the United States and Canada resulted in estimated gross incremental savings of more than 425

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<sup>58</sup> To get a sense of magnitude for average US and Canadian demand response capacity savings, 20 MW represents roughly a sixth of the peak capacity of a natural gas combined cycle generating unit in the United States, according to 2015 EIA Form 860, Schedule 3 data. In addition, using 2018 EIA Form 860, Schedule 3 data, the “total” DR savings of 101,605 MW is roughly equivalent to the combined net summertime capacity of the 90 largest power plants in the United States (or at least the ones that responded to the EIA data request). Data accessed at “Form EIA-860 detailed data,” Energy Information Administration, accessed June 2019, [eia.gov/electricity/data/eia860/](http://eia.gov/electricity/data/eia860/).

million therms of gas in 2018. This is equivalent to approximately 2.3 million metric tons of avoided CO<sub>2</sub> emissions.<sup>59</sup>

Figure 28. **2018 US and Canadian Incremental Natural Gas Savings (MDth)**

	Residential	Low Income	Multifamily	C & I	Other	No Break out	Ratepa yer Total
<b>United States</b>							
**							
Northeast	3,346	794	242	4,288	53	-	8,723
Midwest	2,527	279	116	4,339	74	-	7,335
South	488	18	2	399	-	-	907
West	3,340	477	160	2,710	7,378	-	14,065
<b>US Subtotal</b>	<b>9,701</b>	<b>1,569</b>	<b>519</b>	<b>11,736</b>	<b>7,505</b>	<b>-</b>	<b>31,030</b>
<b>Canada ***</b>							
	275	140	-	11,026	2	-	11,442
<b>Binational Total</b>	<b>9,976</b>	<b>1,708</b>	<b>519</b>	<b>22,762</b>	<b>7,507</b>	<b>-</b>	<b>42,473</b>

**Notes:**

\* Based on estimated total of all energy savings that accumulated from new participants in existing programs and all participants in new programs in 2017.

\*\* Ninety-one (91) percent of all gas respondents in the United States that reported gas programs reported a value for incremental savings. Of those that reported a value for incremental savings, eighty-nine percent reported gross incremental savings. For respondents that did not report gross incremental savings, CEE used net incremental savings in calculating totals.

\*\*\* One hundred percent of all gas respondents in Canada that reported gas programs reported a value for incremental savings. Of those that reported a value for incremental savings, 80 percent reported gross incremental savings.

0 depicts gross incremental savings for US and Canadian natural gas programs broken out by customer class. Commercial and industrial programs accounted for the majority of energy savings (54 percent), followed by residential programs (23 percent), and “other” programs (18 percent). Multifamily programs represented four percent of savings, while low income programs represented one percent. This breakdown is somewhat different

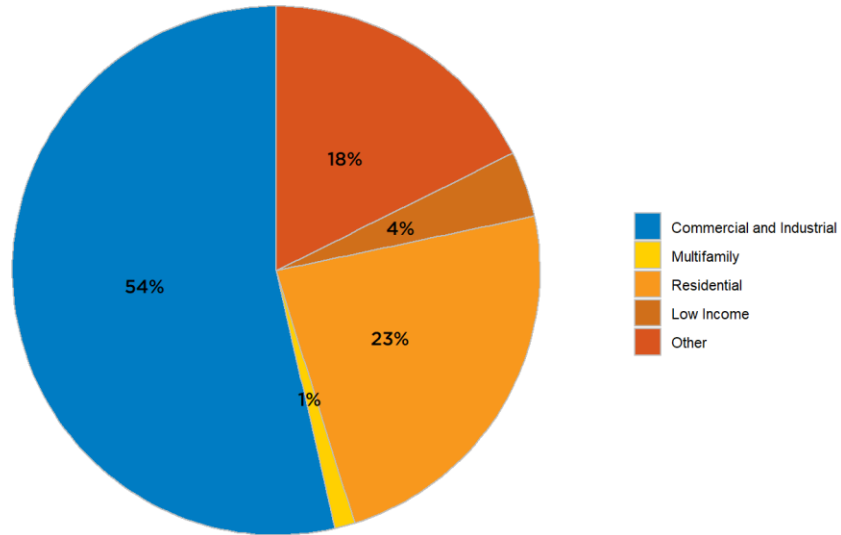
<sup>59</sup> Calculated using the EPA Greenhouse Gas Equivalencies Calculator, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>. June 2020.

from that of US and Canadian gas energy efficiency expenditures, in which residential programs accounted for 43 percent of expenditures, commercial and industrial programs accounted for 21 percent, and low income programs accounted for 25 percent. These findings are similar to those from the last several years' surveys. This result may indicate high savings per dollar spent in the C&I sector, but it may also reflect a difference in reported savings type—gross or net—between program administrators with high residential and high C&I expenditures.<sup>60</sup>

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<sup>60</sup> See the opening paragraphs of Section 5 for more information on the savings accounting scheme used in this report.

Figure 29. 2018 US and Canadian Gross Incremental Natural Gas Savings by Customer Class



Based on the natural gas gross incremental savings provided in Figure 28 and the savings breakout in 0, in 2018 the value of natural gas energy efficiency savings across the United States and Canada totaled approximately \$240 million.<sup>61</sup>

<sup>61</sup> Natural gas retail values for the United States and Canada were calculated based on the average retail price per thousand cubic feet across the United States in 2018 using data from the Energy Information Administration. Average natural gas prices used: \$10.50 per Mcf (residential), \$7.78 per Mcf (commercial), and \$4.21 per Mcf (industrial). The residential retail rate was used for low income and multifamily program savings. The rate for combined C&I programs was determined by taking the average of the commercial and industrial retail rates. The rate for “other” programs was calculated by taking the average of the residential, commercial, and industrial retail rates. “Natural Gas Prices,” Energy Information Administration, last modified January 28, 2018, accessed June, 2020, [eia.gov/dnav/ng/ng\\_pri\\_sum\\_dcu\\_nus\\_a.htm](http://eia.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm).

## Appendix A Electric Energy Efficiency Program Categories

Respondents who could provide data for individual programs were asked to select a customer class and then a program type for each program they identified. If it was not possible to provide data on the program level, respondents were asked to provide rough percentage breakdowns of their budgets, expenditures, and savings into customer classes and then to provide further percentage breakdowns by common program types (again, if possible). This appendix provides the title and definition for each program type, grouped by customer class. CEE slightly modified some program categories in 2014 based on feedback from respondents and discussions with Lawrence Berkeley National Laboratory; similar modifications may occur in future years for the purposes of the CEE research effort.

### Residential Programs

**Appliance recycling:** Programs designed to remove less efficient appliances, typically refrigerators and freezers, from households.

**Behavior, online audit, feedback:** Residential programs designed around directly influencing household habits and decision-making on energy consumption through quantitative or graphical feedback on consumption, sometimes accompanied by tips on saving energy. These programs include behavioral feedback programs in which energy use reports compare a consumer's household energy consumption with those of similar consumers; online audits that are completed by the consumer; and in-home displays that help consumers assess their use in near real time. This program category does not include on-site energy assessments or audits.

**Consumer product rebate for appliances:** Programs that incentivize the sale, purchase and installation of appliances, e.g. refrigerators, dishwashers, clothes washers, and dryers, that are more efficient than current standards. Appliance recycling and the sale, purchase, and installation of HVAC equipment, water heaters, and consumer electronics are accounted for separately.

**Consumer product rebate for electronics:** Programs that encourage the availability and purchase or lease of more efficient personal and household electronic devices, including but not limited to televisions, set-top boxes, game consoles, advanced power strips, cordless telephones, PCs and peripherals specifically for home use along with chargers for phones, smart

phones, and tablets. A comprehensive efficiency program to decrease the electricity use of consumer electronics products includes two foci: product purchase and product use. Yet not every consumer electronics program seeks to be comprehensive. Some programs embark on ambitious promotions of multiple electronics products, employing upstream, midstream, and downstream strategies with an aggressive marketing and education component. At the other end of the continuum, a program administrator may choose to focus exclusively on consumer education.

**Consumer product rebate for lighting:** Programs aimed specifically at encouraging the sale, purchase, and installation of more efficient lighting in the home. These programs range widely from point-of-sale rebates to CFL mailings or giveaways. Measures tend to be CFLs, fluorescent fixtures, LED lamps, LED fixtures, LED holiday lights, and lighting controls, including occupancy monitors and switches.

**Financing:** Programs designed to provide or facilitate loans, credit enhancements, or interest rate reductions and buy downs. As with other programs, utility costs are included, such as the costs of any inducements for lenders, e.g. loan loss reserves, interest rate buy downs, etc. Where participant costs are available for collection, these ideally include the total customer share, i.e. both principal meaning the participant payment to purchase and install measures and interest on that debt. Most of these programs are directed towards enhancing credit or financing for residential structures.

**Multifamily:** Multifamily programs are designed to encourage the installation of energy efficient measures in common areas, units, or both for residential structures of more than four units. These programs may be aimed at building owners or managers, tenants, or both.

**New construction:** Programs that provide incentives and possibly technical services to ensure new homes are built or manufactured to energy performance standards higher than applicable code, e.g. ENERGY STAR® Homes. These programs include new multifamily residences and new or replacement mobile homes.

**Prescriptive HVAC:** Programs designed to encourage the distribution, sale, purchase, and proper sizing and installation of HVAC systems that are more efficient than current standards. Programs tend to support activities that



focus on central air conditioners, air source heat pumps, ground source heat pumps, and ductless systems that are more efficient than current energy performance standards, as well as climate controls and the promotion of quality installation and quality maintenance.

**Prescriptive insulation:** Programs designed to encourage the sale, purchase and installation of insulation in residential structures, often through per square foot incentives for insulation of specific R-values versus an existing baseline. Programs may be point-of-sale rebates or rebates to insulation installation contractors.

**Prescriptive pool pump:** Programs that incentivize the installation of higher efficiency or variable speed pumps and controls, such as timers, for swimming pools.

**Prescriptive water heater:** Programs designed to encourage the distribution, sale, purchase and installation of electric or gas water heating systems that are more efficient than current standards, including high efficiency water storage tank and tankless systems.

**Prescriptive windows:** Programs designed to encourage the sale, purchase, and installation of efficient windows in residential structures.

**Prescriptive other:** Residential programs that provide or incentivize a set of preapproved measures not included in, or distinguishable from, the other residential program categories, e.g. direct install, HVAC, lighting. For example, if a residential program features rebates for a large set of mixed, preapproved offerings, e.g. insulation, HVAC, appliances, and lighting, yet the relative contribution of each measure to program savings is unclear or no single measure accounts for a large majority of the savings, then the program should be classified simply as a residential prescriptive program.

**Whole home audits:** Residential audit programs provide a comprehensive, standalone assessment of a home's energy consumption and identification of opportunities to save energy. The scope of the audit includes the whole home, although the thoroughness and completeness of the audit may vary widely from a modest examination and development of a simple engineering model of the physical structure to a highly detailed inspection of all spaces, testing for air leakage or exchange rates, testing for HVAC duct leakage, and highly resolved modeling of the physical structure with benchmarking to customer utility bills.

**Whole home direct install:** Direct install programs provide a set of preapproved measures that may be installed at the time of a visit to the customer premises or provided as a kit to the consumer, usually at modest or no cost to the consumer and sometimes accompanied by a rebate. Typical measures include CFLs, low flow showerheads, faucet aerators, water heater wrap, and weather stripping. Such programs also may include a basic, walk-through energy assessment or audit, but the savings are principally derived from the installation of the provided measures. Education programs that supply kits by sending them home with school children are not included in this program category; they are classified as education programs.

**Whole home retrofit:** Whole home energy upgrade or retrofit programs combine a comprehensive energy assessment or audit that identifies energy savings opportunities with whole house improvements in air sealing, insulation and, often, HVAC systems and other end uses. The HVAC improvements may range from duct sealing to a tune-up to full replacement of the HVAC systems. Whole home programs are designed to address a wide variety of individual measures and building systems, including but not limited to: HVAC equipment, thermostats, furnaces, boilers, heat pumps, water heaters, fans, air sealing, insulation of attic, wall, or basement, windows, doors, skylights, lighting, and appliances. As a result, whole home programs generally involve one or more rebates for multiple measures. Whole home programs generally come in two types: comprehensive programs that are broad in scope, and less comprehensive, prescriptive programs sometimes referred to as "bundled efficiency" programs. This category addresses all of the former and most of the latter, but it excludes direct install programs that are accounted for separately.

**Other:** Programs designed to encourage investment in energy efficiency activities in residences but are so highly aggregated, e.g. existing homes programs that include retrofits, appliances, and equipment, etc., and undifferentiated that they cannot be sorted into the residential program categories that are detailed above.

## Low Income

Low income programs are efficiency programs aimed at lower income households, based upon some types of income testing or eligibility. These

programs most often take the form of a single family weatherization, but a variety of other program types are also included in this program category, e.g. multifamily or affordable housing weatherization, low income direct install programs.

## Commercial Programs

**Custom audit:** Programs in which an energy assessment is performed on one or more participant commercial or industrial facilities to identify sources of potential energy waste and measures to reduce that waste.

**Custom retrocommissioning:** Programs aimed at diagnosing energy consumption in a commercial facility and optimizing its operations to minimize energy waste. Such programs may include the installation of certain measures, e.g. occupancy monitors and switches), but program activities tend to be characterized more by tuning or retuning, coordinating and testing the operation of existing end uses, systems and equipment for energy efficient operation. The construction of new commercial facilities that includes energy performance commissioning should be categorized as "New Construction". The de novo installation of energy management systems with accompanying sensors, monitors and switches is regarded as a major capital investment and should be categorized under "Custom - Other".

**Custom other:** Programs designed around the delivery of site-specific projects typically characterized by an extensive onsite energy assessment and identification and installation of multiple measures unique to that facility. These measures may vary significantly from site to site. This category is intended to capture "whole building" approaches to commercial sector efficiency opportunities for a wide range of building types and markets, e.g. office or retail and a wide range of measures.

**Financing:** Programs designed to provide or facilitate loans, credit enhancements, or interest rate reductions and buy downs. As with other programs, utility costs are included, such as the costs of any inducements for lenders, e.g. loan loss reserves, interest rate buy downs, etc.. Where participant costs are available for collection, these ideally include the total customer share, i.e., both principal meaning the participant payment to purchase and install measures and interest on that debt. Most of these

programs are directed toward enhancing credit or financing for commercial structures.

**Government, nonprofit, MUSH:** Government, nonprofit, and MUSH (municipal, university, school and hospital) programs cover a broad swath of program types generally aimed at public and institutional facilities and that include a wide range of measures. Programs that focus on specific technologies, e.g. HVAC and lighting have their own commercial program categories. Examples include incentives or technical assistance to promote energy efficiency upgrades for elementary schools, recreation halls, and homeless shelters. Street lighting is accounted for as a separate program category.

**New construction:** Programs that incentivize owners or builders of new commercial facilities to design and build beyond current code or to a certain certification level, e.g. ENERGY STAR® or LEED®.

**Prescriptive grocery:** Grocery programs are prescriptive programs aimed at supermarkets and are usually designed around indoor and outdoor lighting and refrigerated display cases.

**Prescriptive HVAC:** Commercial HVAC programs encourage the sale, purchase and installation of heating, cooling, or ventilation systems at higher efficiency than current energy performance standards, across a broad range of unit sizes and configurations.

**Prescriptive IT and office equipment:** Programs aimed at improving the efficiency of office equipment, chiefly commercially available PCs, printers, monitors, networking devices, and mainframes not rising to the scale of a server farm or floor. Programs for data centers are included in the industrial sector, under the “Custom Data Centers” category.

**Prescriptive lighting:** Commercial lighting programs incentivize the installation of higher efficiency lighting and controls. Typical measures might include T8 or T5 fluorescent lamps and fixtures; CFLs and fixtures; LEDs for lighting; displays, signs, and refrigerated lighting; metal halide and ceramic lamps and fixtures; occupancy controls; daylight dimming; and timers.

**Prescriptive performance contract or DSM bidding:** Programs that incentivize or otherwise encourage energy services companies (ESCOs) and participants to perform energy efficiency projects, usually under an energy

performance contract (EPC), a standard offer, or another arrangement that involves ESCOs or customers offering a quantity of energy savings in response to a competitive solicitation process with compensation linked to achieved savings.

**Prescriptive other:** Prescriptive programs that encourage the purchase and installation of some or all of a specified set of preapproved measures besides those covered in other measure-specific prescriptive programs, e.g. HVAC and lighting.

**Small commercial custom:** Custom programs applied to small commercial facilities. See the commercial "Custom" categories above for additional detail.

**Small commercial prescriptive:** Prescriptive programs applied to small commercial facilities. See the commercial "Prescriptive" categories above for additional detail. Such programs may range from a walk-through audit and direct installation of a few preapproved measures to a fuller audit and a fuller package of measures. Audit only programs have their own category.

**Street lighting:** Street lighting programs include incentives or technical support for the installation of higher efficiency street lighting and traffic lights than current baseline.

**Other:** Programs not captured by any of the specific industrial or commercial categories but that are sufficiently detailed or distinct to not be treated as a General C&I program. For example, an energy efficiency program aimed specifically at the commercial subsector but is not clearly prescriptive or custom in nature might be classified as Commercial Other.

## Industrial or Agricultural Programs

**Custom audit:** Programs in which an energy assessment is performed on one or more participant industrial or agricultural facilities to identify sources of potential energy waste and measures to reduce that waste.

**Custom data centers:** Data center programs are custom designed around large-scale server floors or data centers that often serve high tech, banking, or academia. Projects tend to be site specific and involve some combination of lighting, servers, networking devices, cooling chillers, and energy management systems and software. Several of these may be of experimental or proprietary design.

**Custom industrial or agricultural processes:** Industrial programs that deliver custom designed projects that are characterized by onsite energy and process efficiency assessment and a site specific measure set focused on process related improvements that may include, for example, substantial changes in a manufacturing line. This category includes all energy efficiency program work at industrial or agricultural sites that is focused on process and not generic (such programs belong in the custom category) and not otherwise covered by the single measure prescriptive programs, e.g. lighting, HVAC, and water heaters).

**Custom refrigerated warehouses:** Warehouse programs are typically aimed at large-scale refrigerated storage facilities and often target end uses such as lighting, climate controls, and refrigeration systems.

**Custom other:** Programs designed around the delivery of site specific projects typically characterized by an extensive onsite energy assessment and identification and installation of multiple measures unique to that facility. These measures may vary significantly from site to site. This category is intended to capture whole facility approaches to industrial or agricultural sector efficiency opportunities for a wide range of building types and markets.

**Financing:** Programs designed to provide or facilitate loans, credit enhancements, or interest rate reductions and buy downs. As with other programs, utility costs are included, such as the costs of any inducements for lenders, e.g. loan loss reserves, interest rate buy downs, etc.. Where participant costs are available for collection, these ideally include the total customer share. i.e., both principal meaning the participant payment to purchase and install measures and interest on that debt. Most of these programs are directed toward enhancing credit or financing for industrial or agricultural structures.

**New construction:** Programs that incentivize owners of builders of new industrial or agricultural facilities to design and build beyond current code or to a certain certification level, e.g. ENERGY STAR® or LEED®.

**Prescriptive agriculture:** Farm and orchard agricultural programs that primarily involve irrigation pumping and do not include agricultural refrigeration or processing at scale.

**Prescriptive motors:** Motors programs usually offer a prescribed set of approved, higher efficiency motors, with industrial motors programs typically getting the largest savings from larger, high powered motors, >200 hp.

**Prescriptive other:** Prescriptive programs that encourage the purchase and installation of some or all of a specified set of preapproved measures besides those covered in other measure specific prescriptive programs on this list.

**Self direct:** Industrial programs that are designed to be delivered by the participant, using funds that otherwise would have been paid as ratepayer support for all DSM programs. These programs may be referred to as "opt out" programs, among other names.

**Other:** Programs not captured by any of the specific industrial or agricultural program categories but that are sufficiently distinct to the industrial and agricultural sector to not be treated as a C&I program, e.g. programs aimed specifically at an industrial subsector, but that are not clearly prescriptive or custom in nature.

## C&I Programs

**Audit:** Programs in which an energy assessment is performed on one or more participant facilities to identify sources of potential energy waste and measures to reduce that waste.

**Custom:** Programs designed around the delivery of site-specific projects typically characterized by an extensive onsite energy assessment and identification and installation of multiple measures unique to that facility. These measures may vary significantly from site to site. This category is for programs that address both the commercial and industrial sectors and cannot be relegated to one sector or another for lack of information on participation or savings.

**Mixed offerings:** Programs that cannot be classified under any of the specific commercial or industrial program categories and that span a large variety of offerings aimed at both the commercial and industrial sectors.

**New construction:** Programs that incentivize owners or builders of new commercial or industrial facilities to design and build beyond current code or to a certain certification level, e.g. ENERGY STAR® or LEED®. This category

should be used sparingly for those programs that cannot be identified with either the commercial or industrial sector on the basis of information available about participation or the sources of savings.

**Prescriptive:** Prescriptive programs that encourage the purchase and installation of some or all of a specified set of preapproved industrial or commercial measures but which cannot be differentiated by sector based upon the description of the participants or the nature or source of savings.

**Self direct:** Generally large commercial and industrial programs that are designed and delivered by the participant, using funds that otherwise would have been paid as ratepayer support for all DSM programs. This category is to be used for self direct or opt out programs that address both large commercial and industrial entities but that cannot be differentiated between these sectors because the nature and source of the savings is not available or is also too highly aggregated.

**Other:** Programs not captured by any of the specific industrial or commercial categories and are sufficiently distinct to the industrial and commercial sectors but cannot be differentiated by individual sector.

## Cross Sector

**Codes and standards:** In codes and standards programs, the program administrator may engage in a variety of activities designed to advance the adoption, application or compliance level of building codes and end use energy performance standards. Examples might include advocacy at the state or federal level for higher standards for HVAC equipment; training of architects, engineers, builders, and developers on compliance; and training of building inspectors in ensuring the codes are met.

**Market transformation:** Programs that encourage a reduction in market barriers resulting from a market intervention, as evidenced by a set of market effects that is likely to last after the intervention has been withdrawn, reduced, or changed. Market transformation programs are gauged by their market effects, e.g. increased awareness of energy efficient technologies among customers and suppliers; reduced prices for more efficient models; increased availability of more efficient models; and ultimately, increased market share for energy efficient goods, services, and design practices.



Example programs might include upstream incentives to manufacturers to make more efficient goods more commercially available and point-of-sale or installation incentives for emerging technologies that are not yet cost-effective. Workforce training and development programs are covered by a separate category. Upstream incentives for commercially available goods are sorted into the program categories for those goods, e.g. consumer electronics or HVAC.

**Marketing, education, and outreach:** Includes most standalone marketing, education, and outreach programs, e.g. statewide marketing, outreach, and brand development. This category also covers in-school energy and water efficiency programs, including those that supply school children with kits of prescriptive measures such as CFLs and low flow showerheads for installation at home.

**Multisector rebates:** Multisector rebate programs include those providing incentives for commercially available end use goods for multiple sectors, e.g. PCs, HVAC.

**Planning, evaluation, other program support:** These programs are separate from marketing, education, and outreach programs and include the range of activities not otherwise accounted for in program costs, but that are needed for planning and designing a portfolio of programs and for otherwise complying with regulatory requirements for DSM activities outside of program implementation. These activities generally are focused on the front and back end of program cycles, in assessing prospective programs; designing programs and portfolios; assessing the cost-effectiveness of measures, programs, and portfolios; and arranging for, directing, or delivering reports and evaluations of the process and impacts of those programs where those costs are not captured in program costs.

**Research:** These programs are aimed generally at helping the program administrator identify new opportunities for energy savings, e.g. research on emerging technologies or conservation strategies. Research conducted on new program types or the inclusion of new, commercially available measures in an existing program are accounted for separately under cross cutting program support.

**Shading and cool roofs:** Shading and reflective programs include programs designed to lessen heating and cooling loads through changes to

the exterior of a structure, e.g. tree plantings to shade walls and windows, window screens, and cool roofs. These programs are not necessarily specific to a sector.

**Voltage reduction transformers:** Programs that support investments in distribution system efficiency or enhance distribution system operations by reducing losses. The most common form of these programs involve the installation and use of conservation voltage regulation or reduction or optimization systems and practices that control distribution feeder voltage so that utilization devices operate at their peak efficiency, which is usually at a level near the lower bounds of their utilization or nameplate voltages. Other measures may include installation of higher efficiency transformers. These programs generally are not targeted to specific end users but typically involve changes made by the electricity distribution utility.

**Workforce development:** Workforce training and development programs are a distinct category of market transformation program designed to provide the underlying skills and labor base for deployment of energy efficiency measures.

**Other:** This category is intended to capture all programs that cannot be allocated to a specific sector (or are multisectoral) and cannot be allocated to a specific program type.

## Appendix B List of US and Canadian Electric Energy Efficiency Program Category Expenditures

Figure B-1. US Electric Energy Efficiency Program Category Expenditures (in USD)

Customer Class	Program Type	2018 Expenditures
Residential	Other	576,233,937.90
C&I	Mixed Offerings	484,452,475.68
Low Income	Low Income	479,359,381.16
C&I	Custom	406,536,344.67
Commercial	Other	359,641,018.87
C&I	Other	305,779,695.31
C&I	Prescriptive	280,039,457.67
Residential	Consumer Product Rebate - Lighting	244,928,095.31
NA	Other: Other	177,747,370.69
Residential	Whole Home - Retrofit	169,798,663.86
Cross Sector	Other (Cannot Categorize)	145,086,398.27
Cross Sector	Other	140,959,111.95
Commercial	Custom - Other	99,535,119.50
Residential	Whole Home - Audits	96,470,018.92
Cross Sector	Planning/Evaluation/Other Program Support	85,026,485.97
Commercial	Small Commercial - Prescriptive	82,786,659.80
Commercial	Other (Cannot Categorize)	81,612,382.86
C&I	New Construction	81,086,100.98
Residential	Other (Cannot Categorize)	80,216,299.35
Residential	Prescriptive - Other	74,698,370.19
C&I	Other (Cannot Categorize)	71,737,388.62
Residential	Prescriptive - HVAC	71,124,359.79
Residential	Consumer Product Rebate - Appliances	67,454,125.84
Residential	Behavioral/Online Audit/Feedback	65,444,415.26
Cross Sector	Marketing, Education, Outreach	59,812,546.66
Residential	New Construction	58,561,681.41
Industrial	Custom - Industrial or Agricultural Processes	57,476,980.00
Residential	Whole Home - Direct Install	49,763,103.15
Commercial	Prescriptive - Lighting	47,390,684.86
Residential	Appliance Recycling	46,392,420.68
Commercial	New Construction	38,552,876.38
Commercial	Prescriptive - Other	36,792,187.50
Residential	Multifamily	33,466,180.72
Industrial	Other (Cannot Categorize)	33,045,517.67

<b>Industrial</b>	Other	30,366,235.31
<b>Cross Sector</b>	Codes & Standards	22,718,176.15
<b>Commercial and Industrial</b>	Audit	20,031,580.02
<b>C&amp;I</b>	Self Direct	18,458,967.44
<b>Residential</b>	Consumer Product Rebate - Electronics	18,007,067.24
<b>Commercial</b>	Custom - Audit	17,847,196.31
<b>Cross Sector</b>	Multi-Sector Rebates	15,228,931.38
<b>Commercial</b>	Prescriptive - HVAC	12,598,309.41
<b>Commercial</b>	Small Commercial - Custom	9,773,672.00
<b>Cross Sector</b>	Market Transformation	8,398,173.38
<b>Cross Sector</b>	Workforce Development	7,652,654.07
<b>Cross Sector</b>	Research	6,645,349.66
<b>Industrial</b>	Custom - Other	3,243,538.17
<b>Industrial</b>	Custom - Audit	2,833,838.17
<b>Industrial</b>	Custom - Data Centers	2,695,369.14
<b>Commercial</b>	Govt./Nonprofit/MUSH	2,435,988.87
<b>Commercial</b>	Custom - Retrocommissioning	2,428,941.36
<b>Industrial</b>	Prescriptive - Agriculture	2,012,689.65
<b>Residential</b>	Prescriptive - Insulation	945,162.00
<b>Cross Sector</b>	Voltage Reduction/Transformers	846,831.64
<b>Industrial</b>	Prescriptive - Other	833,196.00
<b>Residential</b>	Prescriptive - Windows	823,520.51
<b>Cross Sector</b>	Shading/Cool Roofs	734,346.10
<b>Commercial</b>	Street Lighting	323,768.66
<b>Residential</b>	Prescriptive - Water Heater	304,685.05

**Figure B-2: Canadian Electric Energy Efficiency Program Category Expenditures (in USD and CAD)**

Customer Class	Program Type	2018 Expenditures USD	2018 Expenditures CAD
Commercial	Prescriptive - Lighting	152,511,958.13	197,609,744.15
Industrial	Custom - Industrial or Agricultural Processes	89,327,105.64	115,741,130.78
Residential	Consumer Product Rebate - Lighting	57,535,796.69	74,549,131.77
Cross Sector	Planning/Evaluation/Other Program Support	49,256,797.80	63,822,032.91
Commercial	Small Commercial - Custom	37,637,534.00	48,766,952.80
Commercial and Industrial	Prescriptive	28,893,797.80	37,437,693.81
Cross Sector	Market Transformation	27,293,797.80	35,364,573.81
Cross Sector	Marketing, Education, Outreach	26,993,797.80	34,975,863.81
Cross Sector	Multi-Sector Rebates	26,993,797.80	34,975,863.81
Residential	Prescriptive - HVAC	26,305,336.62	34,083,824.66
Industrial	Other (Cannot Categorize)	23,090,876.44	29,918,848.60
Commercial and Industrial	Custom	18,896,898.90	24,484,711.90
Commercial	Prescriptive - HVAC	17,873,958.78	23,159,288.39
Commercial	Custom - Retrocommissioning	16,937,464.00	21,945,872.10
Commercial	Small Commercial - Prescriptive	16,382,841.09	21,227,247.20
Low Income	Low Income	15,490,796.33	20,071,424.80
Commercial	Street Lighting	15,306,991.24	19,833,268.56
Commercial and Industrial	Mixed Offerings	15,212,898.90	19,711,353.10
Commercial	Other (Cannot Categorize)	10,002,480.52	12,960,214.00
Residential	Other (Cannot Categorize)	9,946,574.37	12,887,776.41
Residential	Behavioral/Online Audit/Feedback	9,858,000.00	12,773,010.60
Cross Sector	Other (Cannot Categorize)	7,918,313.18	10,259,758.39
Residential	Whole Home - Retrofit	6,603,543.00	8,556,210.67
Commercial	New Construction	5,242,000.00	6,792,059.40
Cross Sector	Codes & Standards	5,179,900.00	6,711,596.43
Residential	Consumer Product Rebate - Appliances	4,141,819.67	5,366,555.75
Residential	New Construction	3,932,875.40	5,095,826.65
Cross Sector	Other	3,900,000.00	5,053,230.00

Commercial	Prescriptive - Grocery	3,652,531.71	4,732,585.34
Industrial	Prescriptive - Motors	3,599,173.04	4,663,448.51
Residential	Whole Home - Direct Install	3,289,184.00	4,261,795.71
Residential	Appliance Recycling	2,769,207.19	3,588,061.75
Residential	Prescriptive - Other	2,300,000.00	2,980,110.00
Residential	Whole Home - Audits	2,028,248.00	2,628,000.93
Industrial	Custom - Audit	1,799,586.52	2,331,724.25
Residential	Other	1,369,839.00	1,774,900.39
Residential	Prescriptive - Insulation	1,349,000.00	1,747,899.30
Industrial	Custom - Data Centers	719,834.61	932,689.70
Commercial	Custom - Other	658,766.00	853,563.11
Commercial	Custom - Audit	383,825.00	497,322.05
Commercial	Prescriptive - Other	355,418.00	460,515.10
Commercial	Other	180,000.00	233,226.00
Residential	Prescriptive - Water Heater	25,000.00	32,392.50

## Appendix C      Electric Demand Response Program Expenditures

In 2013, CEE modified the demand response program categories to align with those used by FERC. FERC defines several demand response program types and groups them into two major categories:

- Incentive-based programs, which tend to involve incentives for contracting with utilities to curtail load when necessary.
- Time-based programs, which generally employ graduated pricing schemes that incent customers to reduce load during system peaks.

### US Electric Demand Response Program Category Expenditures

Approximately two-thirds of 2018 demand response program expenditures went to incentive-based programs, as shown in Figure C-1 below. Of those expenditures, nearly half, 45 percent, went to direct load control programs, followed by interruptible load at 18 percent, “other” incentive-based programs at 31 percent, emergency demand response at two percent, and load as a capacity resource at four percent. (See Figure C-2.) Relative rankings within incentive-based program are similar to last year’s. Most investment flowed to direct load control, increasing from 43 to 46 percent of the total. Interruptible load programs decreased for the third year in a row from 31 percent of reported expenditures in 2016, to 25 percent in 2017, to 18 percent. For the second year in a row, the proportion of “other” incentive-based programs increased, from 10 percent of reported expenditures in 2016, to 20 percent in 2017, to 31 percent in 2018, driven by program administrators more frequently being unable to break out incentive expenditures.

Four percent of demand response expenditures went to time-based programs, about the same level as last year’s results. Of this spending, 70 percent was allocated to peak time rebate programs, 7 percent to real time pricing, and 9 percent to time of use pricing.

Figure C-1.

### 2018 US Electric Demand Response Expenditures: General Categorization

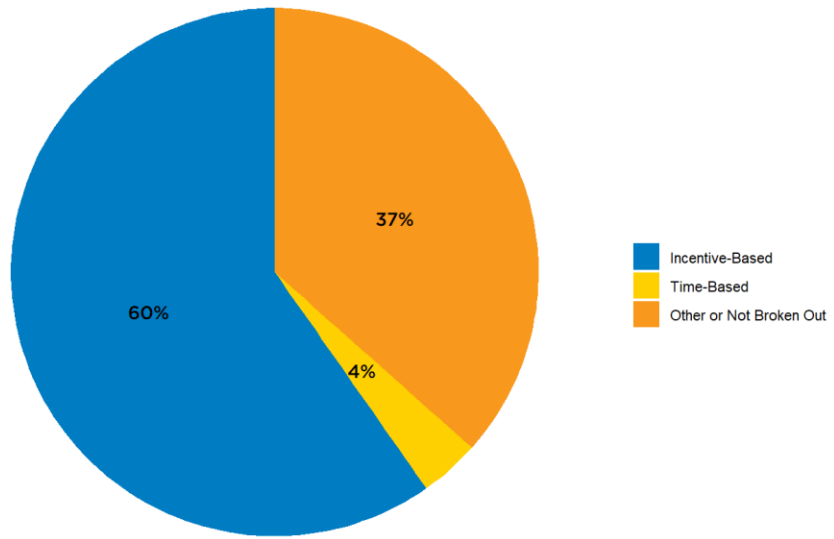


Figure C-2.



2018 US Electric Demand Response Expenditures: Incentive-Based Programs

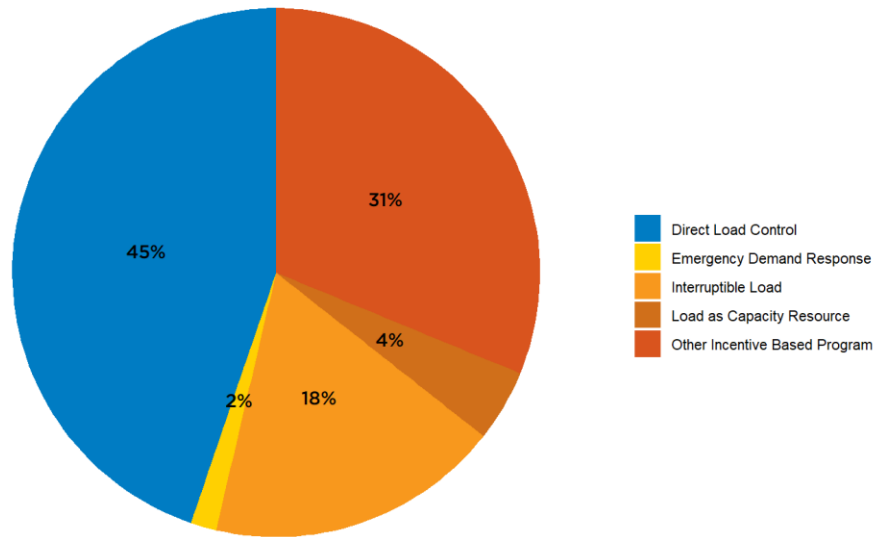


Figure C-3.

### 2018 US Electric Demand Response Expenditures: Time-Based Programs

