

Appendix C: Electricity conservation program results

Abstract

This chapter reviews the 2016 and 2017 results of electricity conservation programs and initiatives funded by electricity ratepayers. These include:

- conservation programs delivered to distribution-connected customers by local distribution companies (LDCs) and the Independent Electricity System Operator (IESO) under the Conservation First Framework (CFF)
- conservation programs delivered by the IESO to larger transmission-connected customers, and
- demand response programs and market mechanisms that curtail electricity use at times of system peak demand.

The CFF program framework has been very successful in achieving electricity savings. In 2016, LDCs achieved 1.5 terawatt-hours (TWh) of incremental electricity savings persisting to 2020, similar results to 2015. 2017 was the best performing year for the province to date, with LDCs achieving 1.8 TWh of incremental savings that will persist to the end of 2020. At the end of 2017, halfway through the six-year framework, LDCs are collectively on track to achieve the provincial target of 7.4 TWh, already having achieved 66% (4.9 TWh) of this 6-year target. If current trends continue, this target will be achieved or exceeded within the allocated budget. This will reduce provincial electricity use in 2020 by roughly 4-5% below what it would otherwise be. Performance across LDCs varies widely, with 59 of 68 LDCs on pace to meet or exceed their local target.

Programs for commercial and industrial customers were responsible for more than 60% of the province's persistent savings to date, with the Retrofit program leading the charge. Residential programs such as the Coupon/Instant Discount Program (primarily incenting efficient LED lighting) and the HVAC program (efficient air conditioning and furnaces) brought in substantial results, with the Coupon/Instant Discount Program driving an increasing number of LED sales in 2016 and 2017.

Under the CFF, conservation program innovation at the local level has flourished, with 12 local programs and 22 pilots launching in 2016 and 2017. These programs, particularly the Social Benchmarking program, the PUMPSaver Program and the PoolSaver Program are delivering an increasing share of savings.

The IESO's program for large (primarily industrial) transmission-connected customers has been less successful. This program achieved 0.28 TWh in persistent savings (21% of the current target of 1.3 TWh, which was originally a 1.7 TWh target) at the end of 2017. A portion (0.4 TWh) of the original target and budget for this program have consequently been reallocated to other IESO programs for distribution-connected customers. This budget will be used by the IESO to deliver a new pay-for-performance program and to ensure province-wide availability of key programs (particularly the program for low-income customers) in parts of the province where these programs were not being offered by LDCs.

In terms of demand response initiatives, the IESO has contracted a significant amount of demand response through its annual auction at a cost that has dropped about 40% in the last four years. To date, the capacity procured at the auction has not been called upon. However, the IESO did successfully curtail 285 megawatts of peak demand from contracted demand response resources during the September 2017 heatwave.

Conservation spending on all of these initiatives was \$391 million in 2016 and \$541 million in 2017, roughly 2% of the total cost of operating the electricity system. The cost-effectiveness of conservation programs, especially those delivered by the LDCs, has improved since 2015, delivering savings in 2017 at a cost of less than two cents per kWh of electricity saved. Conservation programs delivered in 2017 delivered roughly two and a half dollars in benefits for every dollar spent, primarily from avoiding the need for new electricity generation and reducing fuel and operational costs for existing electricity generators.

Contents

C.1	Introduction	211
C.2	Utility conservation programs	211
C.2.1	Conservation First Framework	211
C.2.2	Province-wide results	213
C.2.3	Individual program results	214
C.2.4	Individual LDC performance	225
C.3	Industrial Accelerator Program (IAP) for large customers	228
C.4	IESO's demand response programs	228
C.4.1	Annual Demand Response (DR) Auction	229
C.4.2	Capacity Based Demand Response (CBDR)	229
C.4.3	Integrating demand response into Market Renewal	229
C.4.4	Demand response results	230
C.4.5	DR activations in 2016 and 2017	231
C.5	Electricity conservation spending	231
C.6	Program cost-effectiveness	234
Endnotes		238

C.1 Introduction

Electricity conservation initiatives are funded through provincial electricity charges¹, in order to reduce long-term costs for electricity ratepayers by avoiding more expensive electricity supply alternatives. These include conservation and demand management initiatives geared towards distribution and transmission customers province-wide.

Electricity conservation initiatives reduce long-term costs for electricity ratepayers by avoiding more expensive electricity supply alternatives.

Under the Conservation First Framework (CFF), the province's local distribution companies (LDCs) deliver province-wide conservation programs to distribution-connected customers under the oversight of the Independent Electricity System Operator (IESO). There is a variety of programs for residential, commercial, institutional and industrial customers. The LDCs also have the opportunity to offer local programs and pilots to their own customers only.

The IESO directly delivers conservation programs to large transmission-connected customers and is also responsible for demand response programs and market mechanisms to reduce peak demand electricity use {as discussed in [Chapter 2](#) of this report, the Green Ontario Fund launched some new initiatives that overlapped to some degree with existing electricity conservation programs. However, these initiatives did not significantly affect electricity conservation results in 2017, and are not covered in this appendix}.

Collectively, these conservation initiatives undertaken in 2017 will deliver 1.9 TWh of annual electricity savings in 2020 (94.6% from CFF programs and 5.4% from the Industrial Accelerator program).² This is

equivalent to about 1.4% of current annual electricity consumption.³ Conservation initiatives undertaken in 2017 also delivered 1065 MW of peak demand savings in 2017 (23.3% from CFF programs, 1.1% from the Industrial Accelerator program, and 75.5% from DR initiatives)⁴. This is equivalent to about 4.8% of 2017's peak demand.⁵

This chapter reviews 2016 and 2017 results for each of these categories of conservation initiatives in turn.

C.2 Utility conservation programs

C.2.1 Conservation First Framework (CFF)

The province of Ontario saw a considerable amount of energy savings in 2016 and in 2017 under the 2015-2020 Conservation First Framework (CFF). This Framework establishes a partnership between the Independent Electricity System Operator (IESO) and Ontario's 68 LDCs⁶ to design and deliver electricity conservation programs to the customers of LDCs (i.e., almost all Ontario electricity users, with the major exception of some large, primarily industrial, companies connected to the high-voltage transmission grid). The 2015-2020 Conservation First Framework (CFF) was established through the Directive issued by the Ontario Minister of Energy to the then Ontario Power Authority (OPA), now the IESO. The Directive instructed the OPA to "*coordinate, support and fund the delivery of CDM {conservation and demand management} programs through the Distributors to achieve a total of 7 TWh reductions in electricity consumption between January 1 2015 and December 21, 2020...*".⁷

Ontario saw considerable of energy savings in 2016 and in 2017 under the 2015-2020 Conservation First Framework.

Table C.1 lists the key elements of the 2015-2020 Conservation First Framework, including the requirement that conservation projects completed in any given year must persist (still be delivering energy savings) until at least the end of the framework (2020)

to be counted towards the final target. The list also highlights that the IESO has to complete a Mid-Term Review by June 1, 2018 to report on the province's progress to date. The Mid-Term Review is discussed in [Chapter 2](#).

Table C.1. Key Elements of the 2015-2020 Conservation First Framework.⁸

Key framework elements	2015-2020 Conservation First Framework
Duration	6 years (2015 is a transition year from the 2011-2014 Conservation and Demand Management framework)
Oversight	Independent Electricity System Operator
Target	Energy savings: 7400 GWH (7.4 TWH) of persistent energy savings in 2020 ⁹ Peak demand: Not an LDC target anymore
Energy savings calculation	Persistent Savings: savings occurring in 2020, from measures installed at any time between 2015 and 2020.
Budget	\$1.8 billion for LDCs +\$0.4 billion for IESO programs and central services ¹⁰
Funding to LDCs	LDCs have one budget for 6 years and can allocate funding between program portfolios as needed as long as LDCs remain cost-effective ¹¹ and offers programs to all customer segments
CDM license requirement	March 31, 2014 Directive stated that the LDC shall "make CDM programs available to customers in its licensed service area and shall, as far as is appropriate and reasonable having regard to the composition of the Distributor's customer base, do so in relation to each customer segment in its service area" ¹² However, a subsequent Directive issued in December 2016 mandated LDCs to revise their CDM plans "outlining how they will make all approved province-wide CDM programs available in their licensed service areas" and "where a Distributor with eligible program participants is not making an approved Province-Wide Distributor CDM Program (s) available to eligible program participants in its licensed service area, the IESQ shall deliver the Province-Wide Distributor CDM Program (s) in that Distributor's licensed service area." ¹³
Target allocation	Energy target for each LDC based on estimate of achievable conservation potential in each region and LDC territory ¹⁴
Program composition	LDCs can offer a mix of IESO-approved provincial, regional and local programs, including joint programs with gas companies. ¹⁵ Programs must be approved by the IESO and the "duplication test" rules have been amended to encourage collaboration and local/regional program applications
Incentives	Under a full-cost recovery model, LDCs are eligible for a Mid-Term Incentive, an Achieving Target Incentive and an Exceeding Target Incentive, all of which increase if the LDC is part of a joint plan with other LDCs. Also eligible for a Cost-Efficiency Incentive. LDC can also opt for a pay-for-performance model, where incentives are based on program performance. ¹⁶

Underperformance	IESO will track performance annually and take remedial steps of various degrees to help improve the LDC's underperformance. If performance and cost-effectiveness falls below a certain threshold, the LDC will face financial remedies ¹⁷
Mid-Term Review	Mid-term report completed in May of 2018, has been submitted to the Minister of Energy and is currently awaiting response

Source: 2015-2020 IESO-LDC Energy Conservation Agreement (2014), various Directives and Directions from the Ontario Minister of Energy to the IESO, OPA and OEB from 2014 to present.

2016 was the first full year of the 2015-2020 Conservation First Framework.

C.2.2 Province-wide results

2016 was the first full year of the 2015-2020 Conservation First Framework, since 2015 was considered a transition year between the two conservation frameworks. Given that most LDCs were completing 2011-2014 CDM projects in 2015, 2/3 of the province's LDCs launched CFF on January 1, 2016. (However, results from 2015 conservation programs still contribute to the 2020 target).

In 2016, net energy savings persisting to 2020 from distribution-connected conservation programs was 1512 GWh, which represents 22% of the province's 7 TWh (7000 GWh) six-year target.¹⁸ Savings in 2015 were 1559 GWh (Both 2015 and 2016 results reflect late reporting and true-ups that were captured during subsequent reporting stages, which increased results by roughly 30%).¹⁹ So, the first full year of the new framework delivered roughly the same amount of savings as the previous year.

2017 was a step forward and was the strongest year of performance for the CFF, in terms of delivering persistent energy savings. The province's LDCs achieved persistent net energy savings of 1793 GWh (1.8 TWh). Savings may end up being even higher if

the previous pattern of significant true-ups continues for the 2017 results. In February 2018, the 7 TWh target was amended to 7.4 TWh by a Ministerial Directive that moved 0.4 TWh of target from the Industrial Accelerator Program (IAP, discussed later in the chapter) to the CFF.²⁰ The IESO has decided to allocate the entire transferred budget (\$220 million) and target to centrally-delivered programs only, and has kept the LDC targets and budgets the same.²¹ In other words, the total target for conservation programs for distribution-connected customers is now 7.4 TWh, instead of 7 TWh, but targets for individual LDCs will not increase and are still based on the original 7 TWh target. Combining results from 2015-2017, at the halfway point of the six-year framework, the province has achieved 4.9 TWh of savings that will persist until 2020. This is 69% of the original 7 TWh target, and 66% of the amended 7.4 TWh target.²² Ontario is well on pace to meet or exceed the province-wide target, on time and on budget.

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Figure C.1 presents the incremental first year net energy savings every year since 2011, i.e., it shows the amount of new net savings that are added on by the conservation programs every year. Incremental net energy savings are slightly higher than persistent numbers since not all incremental savings persist

to the end of the framework and are therefore not counted in the final targets. Figure C.1 shows that 2016 saw a dip in incremental savings from 2015 but then ramped up again in 2017. This can be explained by the fact that all the 2011-2014 CDM Framework programs that were completed in 2015 bolstered the incremental results of that year. With 2016 being the

first full year of the CFF, LDCs took some time to ramp up program offerings that would have contributed to lower new savings achieved that year. By 2017, LDCs were fully engaged in CFF, and incremental savings increased by almost 20%. Looked at over the longer period, electricity savings from utility programs have increased dramatically, more than tripling since the early 2010s.

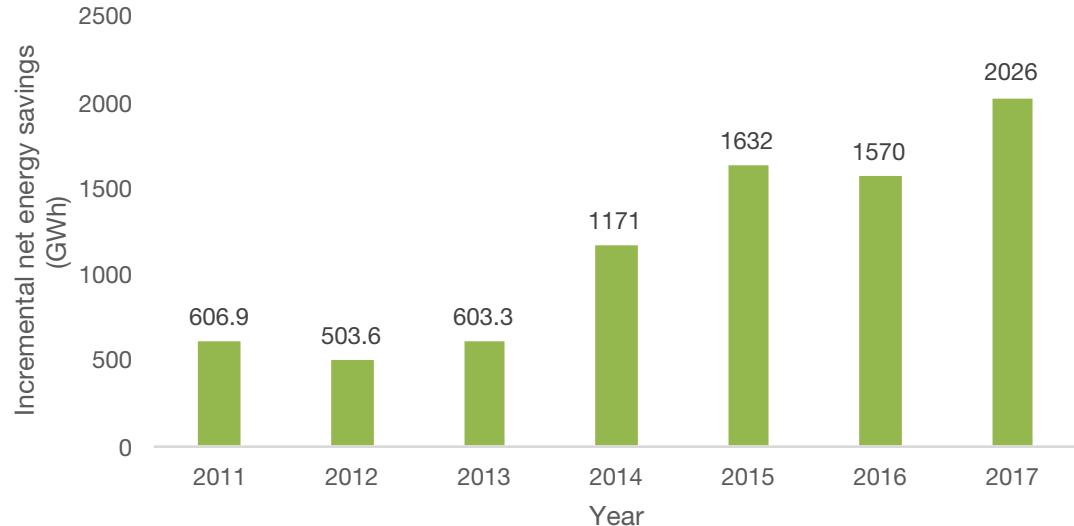


Figure C.1. First year incremental energy savings from new conservation program activity for distribution connected-customers.

Note: 2015 and 2016 incremental energy savings were updated based on true-ups in the 2017 verified results. Not all the first year savings from 2015 to 2017 shown here will be counted towards the final 2020 target as not all incremental savings will persist to the end of the framework. Therefore, incremental savings are slightly higher than persistent savings.

Source: Independent Electricity System Operator, information provided in response to ECO inquiry (15 January 2019); Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab “Province-wide Progress”; Independent Electricity System Operator, 2016 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2017) at Tab “Province-wide Progress”.

Most conservation initiatives also contribute to peak demand reductions.

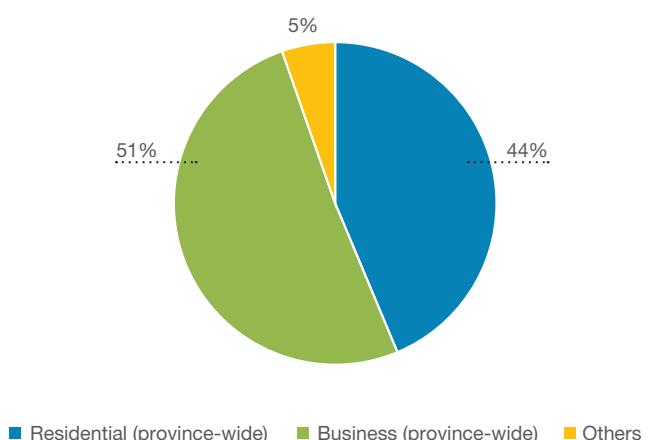
Though the Conservation First Framework only has a target of overall electricity consumption reductions, most conservation initiatives also contribute to peak demand reductions. By the end of 2017, CFF programs had helped reduce peak demand by 649 MW.²³

C.2.3 Individual program results

CFF programs fall into three broad categories:

- province-wide programs for residential customers
- province-wide programs for business customers (which includes industrial and institutional customers), and
- “other” programs, which includes local and regional programs delivered by specific LDCs that are not offered province-wide.

Figure C.2 shows that business programs produce about half of the energy savings.



■ Residential (province-wide) ■ Business (province-wide) ■ Others

Figure C.2. Percentage contributions of programs to 2016 and 2017 energy savings.

Source: Independent Electricity System Operator, 2017 Report on Energy-Efficiency Activities (Toronto: IESO, December 2018) at 6; Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab “Province-wide Progress”; Independent Electricity System Operator, 2016 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2017) at Tab “Province-wide Progress”.

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Figure C.3 presents the highest performing programs in 2016 and 2017 collectively. While there are a large number of conservation programs, a few programs are responsible for the bulk of savings.

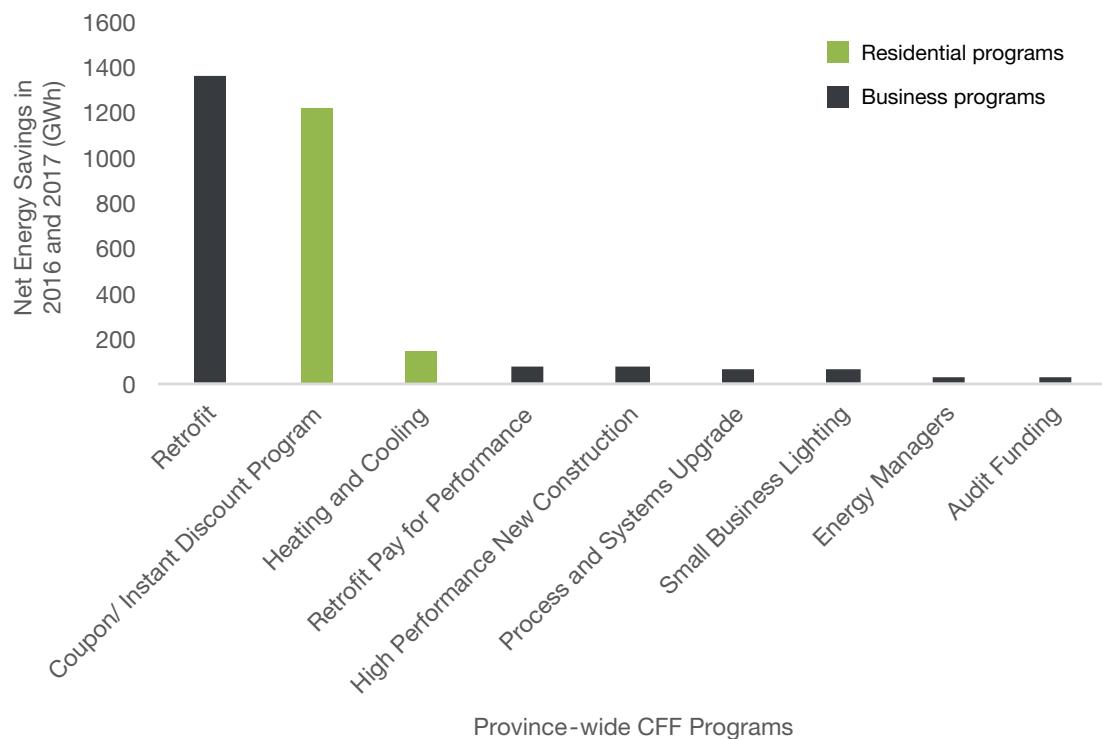


Figure C.3. Leading conservation programs for distribution-connected customers in 2016 and 2017.

Note: The Instant Discount Program replaced the Coupon Program in the fall of 2017.

Source: Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab “Province-wide Progress”; Independent Electricity System Operator, 2016 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2017) at Tab “Province-wide Progress”;

The results by individual programs in terms of persistent net electricity savings and participation for 2016 and 2017 are presented in Table C.2. For comparison purposes, updated results of 2015 are also provided. The table highlights the fact that most programs experienced a decline in terms of

participation and in terms of net energy savings from the first year of the framework. As explained earlier, the 2011-2014 CDM Framework programs that were completed in 2015 were counted under the CFF's 2015 results. Some of the business programs have long lead times and can be expected to deliver higher results in the latter half of the framework.²⁴

Table C.2. 2015, 2016 and 2017 conservation results by program for distribution-connected customers.

Initiatives	Net verified annual energy savings (GWh) persisting until 2020			Participation		
	2015*	2016	2017	2015*	2016	2017
Residential						
Coupon/ Instant Discount**	95.08	477.83	740.20	3,894,321 products	18,999,679 products	29,167,450 products
Heating and Cooling / HVAC Incentives	57.53	77	68.30	127,250 equipment	137,838 equipment	79,915 projects (99,639 equipment)
New Construction/ Residential New Construction and Major Renovation	11.27	2.02	1.80	4,197 homes	204 projects	328 projects (1,898 homes)
Home Assistance / Low Income	14.60	9.19	8.24	17,764 homes	6,566 homes	6,910 homes
Appliance Retirement	0	program discontinued	program discontinued	14,733 appliances	program discontinued	program discontinued
Bi-Annual Retailer Event	73.63	program discontinued	program discontinued	3,205,978 products	program discontinued	program discontinued
Aboriginal Conservation Program	3.24	n/a	n/a	1,586 homes	n/a	n/a
Total residential savings	255.35	566.04	818.50			
Audit Funding / Energy Audit Initiative	45.89	5.52	22.80	586 projects	420 projects	349 projects
Retrofit/ Efficiency Equipment Replacement Incentive	851.88	719.43	644.10	17,580 projects	13,719 projects	8,783 projects
Small Business Lighting	0	13.96	46.43	0 projects	2,485 projects	7,565 projects
High Performance New Construction/ New Construction and Major Renovation	50.04	30.90	46.89	320 projects	241 projects	167 projects

Existing Building Commissioning/ Existing Building Commissioning Incentive	0.32	0.73	0.88	17 projects	30 projects	6 projects
Business Refrigeration	n/a	n/a	4.72	n/a	n/a	1,077 projects
Direct Install Lighting and Water Heating	35.44	program discontinued	program discontinued	18,643 projects	program discontinued	program discontinued
Process and Systems Upgrade / PSU - Project Incentive	274.20	52.74	15.20	24 projects	13 projects	16 projects
Energy Manager / PSU Initiative- Energy Manager	25.18	21.85	11.78	425 projects	123 projects	77 projects
Monitoring and Targeting Program/ PSU Initiative- Monitoring and Targeting	0	0	0	2 projects	0 projects	0 projects
Retrofit Program- Pay-for- Performance	n/a	59.34	19.39	n/a	651 projects	253 projects
Process and Systems Upgrades Program- Pay-for-Performance	n/a	24.14	0	n/a	5 projects	0 projects
Total business savings	1,282.95	928.61	812.20			
Other						
Conservation Fund pilots	8.31	0.27	0.36	n/a	n/a	n/a
LDC Local/Regional programs	0	2.35	144.62	n/a	n/a	n/a
LDC Innovation Fund pilots	0.76	14.67	2.40	n/a	n/a	n/a
Centrally delivered programs	n/a	n/a	14.52	n/a	n/a	n/a
Program enabled savings	10.52	0	0	n/a	n/a	n/a
Other savings	3.24	0	0	n/a	n/a	n/a
Total other program savings	22.83	17.29	161.90	n/a	n/a	n/a
Total	1,559	1,511.94	1,793.00			

*Note: the 2015 results data in this report are updated from the ECO's Every Joule Counts to reflect true-ups and other changes accounted for later by the IESO. For comparison, see pages 86-87 of Every Joule Counts

**Note: the 2017 results include the Coupon program and the Instant Discount Program which was launched mid-2017 and replaced the Coupon program.

Source: Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab "Province-wide Progress"; Independent Electricity System Operator, 2016 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2017) at Tab "Province-wide Progress"; Independent Electricity System Operator, 2015 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, January 2016) at 9-11.

Residential programs

In 2016 and 2017, the province-wide Residential programs delivered 44% of the province's savings, as can be seen from Figure C.2. Three programs contributed over 98% of the portfolio's energy savings over these two years. These programs were the Coupon Program and the Instant Discount Program (discussed further in the textbox below), which accounted for 88% of the residential energy savings, and the Heating and Cooling Program, which provides rebates of up to \$850 for energy efficient furnace and air conditioner purchases, and accounted for 10% of the residential savings.

Residential energy-efficient LED lighting: how important are conservation programs?

The Coupon/Instant Discount programs for residential customers saw explosive growth.

The Coupon/Instant Discount programs for residential customers saw explosive growth in 2016 and 2017, delivering large increases in energy savings. Ontarians bought 3.9 million products through these programs in 2015, 19 million in 2016, and 29.2 million in 2017. Between 2016 and 2017, the Coupon Program and the Instant Discount Program saw a 73% increase in incremental first year savings.²⁵ The Coupon program allows customers to redeem coupons for instant rebates on energy efficient product purchases such as light-emitting diode (LED) lights and other energy efficient products such as timers and indoor motion sensors. In fall 2017, it was replaced by the Instant Discount Program, which provides customers point-of-purchase rebates on energy efficient products at several retailers twice a year²⁶. 2017 verified results show that the first Instant Discount Program event delivered similar participation and energy savings as the Coupon Program model, and is more

cost-effective in terms of program administrator cost.²⁷ For both programs, the financial incentives are complemented by marketing and promotion (including in-store features) to raise awareness of the incentives and the benefits of energy-efficient technologies.

Energy-efficient LED light bulbs were by far the dominant product incented through these programs. In 2016, redemption of LED coupons accounted for 93% of the coupons and 96% of the program savings.²⁸ The increase in the number of energy-efficient LEDs bought through the program is impressive, and is due in part to the drop in LED prices and expansion of available LED models.²⁹

The ECO was initially skeptical as to whether the program was really responsible for these results. Given the falling prices of LEDs³⁰ and their growing share of the residential lighting market, wasn't it likely that many of these purchases would have occurred anyway, without the Coupon/Instant Discount Programs and the small financial incentives it offered to customers (only \$1-\$2 per bulb in 2017)? Amplifying this concern was the switch to the "instant discount" program model – some customers would now be learning about the incentive for the first time when they were already at the cash register (meaning the incentive could not have affected their purchasing decision).

Program evaluations are completed each year for electricity conservation programs that can assess questions of this nature, and can attempt to calculate the influence of conservation programs on customer's actions. The 2016 and 2017 program evaluation reports for the Coupon and the Instant Discount Programs provide interesting insights on the role of the program in speeding up Ontario's shift to energy-efficient lighting.

New energy efficiency standards took effect in 2014 that essentially eliminated sales of

traditional incandescent bulbs.³¹ However, analysis of similar markets shows that much of the market space has been filled by halogen lightbulbs that are only slightly more efficient, instead of the much more efficient LEDs (or compact fluorescent lamps). Even by the fourth quarter of 2017, these inefficient halogen and incandescent lighting technologies accounted for almost 60% of new residential lighting sales.³² Looking at the total number of bulbs in service, the share of energy-efficient LEDs is even lower, perhaps in the order of 20%.

The evaluation reports assess the question of what type of lighting customers would have purchased in the absence of the Coupon/Instant Discount program through participant surveys. Survey results in 2016 indicated that roughly 40% of participants in the Coupons program would have purchased less-efficient halogen/incandescent lighting in the absence of the program, while 60% would have purchased efficient CFLs or LEDs.³³ Survey results in 2017 further indicated that about 70% of participants were using energy-efficient bulbs purchased through the program as early replacements for older bulbs that were still working (as opposed to replacing bulbs that had burned out).³⁴ The calculated energy savings attributed to the program are adjusted based on these results.

In the 2017 program evaluation for the Instant Discount program, a second method of assessing the program impact was used - comparing participating retailers' sales before, during, and after the fall 2017 Instant Discount event to determine the net sales lift from the program.³⁵ The results of this analysis were striking. Sales of LEDs during the event were a remarkable twelve times as high as in an average month.³⁶ This is convincing evidence that the Instant Discount program, through a combination of financial incentives and marketing and promotion

of energy-efficient technology) is having a real and important impact in transforming Ontario's residential lighting sector to energy-efficient LEDs.

This is convincing evidence that the program is having a real and important impact in transforming Ontario's residential lighting sector to energy-efficient LEDs.

LEDs, however, may not deliver as much value to the electricity system and to greenhouse gas reductions as some other types of conservation measures (such as space heating and cooling) because the timing of their electricity use is not well correlated with Ontario's times of peak demand, when natural gas is used to generate electricity. This issue is discussed in [Chapter 2](#) of this report.

The Heating and Cooling Program contributed 10% to the residential portfolio's performance in 2016 and 2017. A concern though is that there has been a 22% drop in participation between 2015 and 2017 in the program.³⁷ This is because air conditioners of a certain energy efficiency level, which used to account for almost 50% of program activity, are now considered standard technology, and are no longer eligible for incentives.³⁸ Several changes were made to the program in 2017 to increase participation and drive more savings, including adding incentives for air source heat pumps and smart thermostats for electrically heated homes, circulator pumps, and ultra high-efficiency air conditioners.³⁹ Third-party evaluation indicated that contractors remain a key driver of the program since a contractor recommendation goes a long way in the customer's decision to upgrade equipment and take part in the program.⁴⁰

Business programs

Under the 2015-2020 Conservation First Framework, the IESO has merged the commercial and institutional initiatives (business) and industrial initiatives under “business programs”. For consistency, the ECO has also merged the two suites of program, as presented in Table C.2. Figure C.2 shows that business programs delivered close to 51% of the province’s energy savings collectively in 2016 and 2017. The Retrofit Program (including the Pay-for-Performance retrofit projects) continued to be the strongest performing provincial program. It contributed to close to 83% of the portfolio’s savings (for 2016 and 2017 together) and 44% of overall savings collectively.⁴¹ Lighting measures account for a majority of the savings in the program, with custom lighting responsible for 45% of first-year savings in 2017.⁴² Non-lighting measures contributed about 21% of the savings during the same period.⁴³

Several changes have been made to the Retrofit program to increase participation and savings for the rest of the framework, including updating savings and incentive values of non-lighting prescriptive measures, removing measures that had low uptake, adding new measures for the agricultural sector and removing some reporting and evaluation requirements.⁴⁴

Other business programs like the High Performance New Construction (HPNC) Program and the relaunched Small Business Lighting Program each contributed less than 5% each to the portfolio’s 2016-17 results.⁴⁵ The HPNC program saw several amendments at the beginning of 2017 to increase participation. Changes included removing certain building permit requirement timelines, adjusting custom project incentives to better align with the Ontario Building Code, updating modeling requirements and software and updating program processes and tools to simplify the application and approvals process.⁴⁶

The Small Business Lighting Program saw a 212% increase in participation between 2016 and 2017.⁴⁷ The program underwent changes in August 2018 which included an increase in incentives, improvements in

capturing realization rates for more accurate savings calculations and adjustments to the program measure list.⁴⁸

The Business Refrigeration Program, which was launched as a local program by Alectra Utilities during the 2011-2014 CDM Framework and continued to run under CFF, was expanded to a province-wide offering in 2017, and saw over 4.5 GWh of energy savings. The Audit Funding Program observed a 715% increase in net verified energy savings and a 178% increase in net verified demand savings between 2016 (not including true-ups) and 2017.⁴⁹ This increase in net verified savings is due to a large increase in per audit energy savings and the program’s participation and had a positive impact on the program cost effectiveness compared to 2016.⁵⁰

The Process and Systems Upgrade (PSU) Program for larger industrial and business customers continued to have low participation and savings compared to its performance in 2015. This is mainly because 2015 savings included a large number of 2011-2014 projects that completed that year and therefore saw higher results. Given the long lead time, participation and results are expected to ramp up in the last 2 to 3 years of the framework.

PSU results could decline in future years due to a change in project eligibility.

However, PSU results could decline in future years due to a change in project eligibility. Behind-the-meter generation (BMG) projects, which reduce the need for electricity from the grid through on-site generation, accounted for 56% of the energy savings from the industrial scale conservation programs (including the PSU program) in 2017.⁵¹ Combined heat and power (CHP) generation, a form of BMG which uses one fuel source (usually a fossil fuel like natural gas) to produce two outputs- electricity and heat, was considered a CDM activity when the CFF launched in 2015 and

was therefore eligible for incentives under the PSU Program.⁵² However, after the previous government's (now cancelled) Climate Change Action Plan was established in 2016, a Ministerial Directive was issued in 2017 that stated that CHP project applications that use natural gas or other fossil fuels would not be approved as a CDM activity after July 1 2018 because of the associated GHG emissions.⁵³ According to the 2016 evaluation report, CHP PSU projects resulted in a net increase of 20,322 tonnes CO₂e.⁵⁴

While there was initial concern in the industry about the impact the cancellation would have on LDC targets, the industry did anticipate the change based on government discussions. Several LDCs, such as Entegrus and North Bay Hydro, completed their CHP projects prior to the July 2018 deadline, and therefore the results were counted towards their respective targets.⁵⁵ During the 2017 industrial portfolio evaluation survey, approximately 32% of the LDCs were very concerned that they would not be hitting their targets because a majority or the entirety of their industrial projects were CHP.⁵⁶ In April of 2018, the PSU program went through several changes such as increasing participant incentives, removal of the preliminary engineering study requirement, extension of third party participation allowance and simplified participant agreement requirements.

Other programs like the Energy Manager Initiative did not see high direct savings but their roles also include the identification of capital improvements through PSU and the Industrial Accelerator Program.⁵⁷ So the Energy Managers help facilitate higher participation in other incentive programs, and bring about other benefits such as new jobs and the development of new skills, as discussed in **Chapter 1** of this report.

Other programs

Province-wide programs for business and residential customers account for the bulk of savings from the Conservation First Framework, but several other types of programs accounted for about 5% of savings in 2016 and 2017. Figure C.4 breaks down the “other” savings by the different categories for 2016 and 2017.

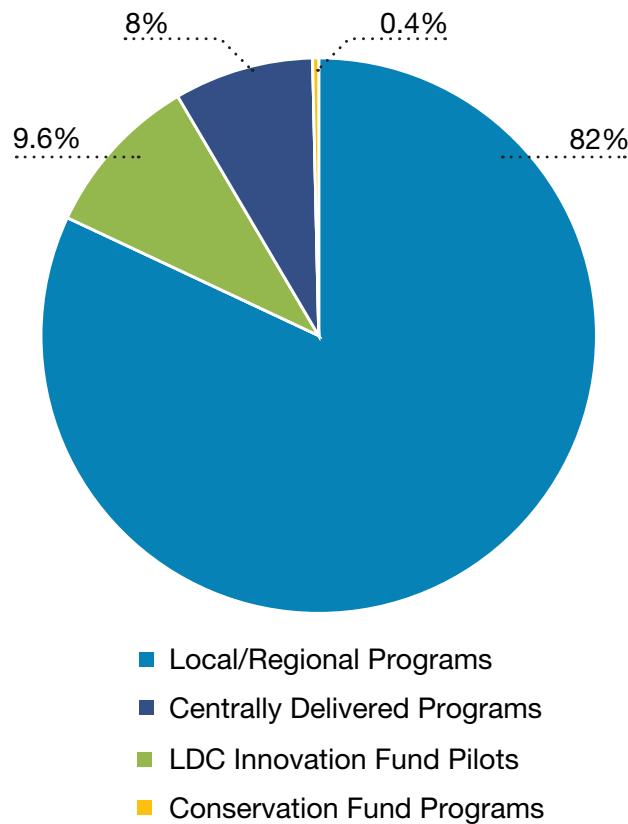


Figure C.4. The different categories of “other” savings in 2016 and 2017.

Source: Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab “Province-wide Progress”; Independent Electricity System Operator, 2016 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2017) at Tab “Province-wide Progress”.

The IESO began reporting results from local and regional LDC programs, LDC Innovation Fund pilots and Conservation Fund pilots in 2016. Several of these initiatives have now started producing energy savings, indicating that the approval process under CFF has been much more conducive to encouraging innovation to meet local/regional needs. As of the end of 2016, 19 LDC Innovation Fund pilots and 12 local and regional programs have been launched in the province.⁵⁸ Another 21 projects have been approved under the Conservation Fund between 2015 and 2017.⁵⁹

For the first time in 2017, local/regional programs delivered a non-trivial share of overall savings.

Local/regional programs

For the first time in 2017, local/regional programs delivered a non-trivial share (roughly 5%) of overall CFF savings.⁶⁰ Programs that produced a majority of those results include the Social Benchmarking Program, the PUMPSaver Program and the Pool Saver Program that were responsible for over 90% of the savings from local/regional programs.⁶¹ All three of these programs were delivered by multiple LDCs across the province.

Some local programs and pilots, while not being cost effective, have been able to offer conservation programs to more vulnerable customers and offer them benefits beyond just electricity bill savings. The textbox “CustomerFirst’s Home Energy Assessment and Retrofit” highlights one such pilot.

CustomerFirst’s Home Energy Assessment and Retrofit pilot⁶²

CustomerFirst is a turnkey clean energy electricity conservation service provider that implements electricity conservation and renewable energy solutions programs for 10 multiple LDCs in across the province, mostly based in Northern Ontario. The company is jointly owned by five LDCs as an affiliate business and it represents the largest joint Conservation and Demand Management (CDM) Plan under the Conservation First Framework in the province. CustomerFirst designed and implemented a pilot under the IESO’s Innovation Fund called the Home Energy Assessment and Retrofit (HEAR) pilot program. The HEAR program was delivered to electrically heated residential customers with high-usage homes in 6 LDC service territories - North Bay Hydro, Northern Ontario Wires, Newmarket-Tay Power, Entegrus Powerlines,

PUC Distribution and Greater Sudbury Hydro. The initiative helped electrically heated residential customers reduce their energy consumption, which represents 30% of the residential customers of those LDCs, by providing them with free in-home use energy assessments, by directly installing high energy efficiency upgrades and also by assessing the feasibility of installing smart programmable thermostats.⁶³ Direct install measures included block heater timers, LED lights, power bars, low flow showerheads and electric water heater blankets. Customers were provided with a custom report based on the in-home assessment that outlined additional actions they could take to achieve further savings. 836 households participated in the pilot, which exceeded the initial target of 750.⁶⁴

The one-year pilot, with a budget of less than \$1 million, achieved net annual savings of 375 MWh and demand savings of 59 kW.⁶⁵ Evaluation results showed that the average participating household was able to reduce their annual electricity usage by 448 KWh.⁶⁶ The evaluation report, however, did not provide an estimate on what this translates to in terms of bill savings. However, 97% of respondents were satisfied with their overall experience with the pilot and 66% of responding participants reported that the pilot had resulted in the customer taking additional actions to save energy. The evaluation report stated that the pilot “met an underserved market need, namely northern and rural electrically-heated residential customers with high electricity usage which lacked program opportunities”.⁶⁷

Due to the high initial start-up costs and savings results of the pilot and the lower than expected results, the pilot did not fare well in terms of cost-effectiveness results were lower than anticipated, with Total Resource Cost (TRC) at 0.28 and Program Administrator Cost (PAC) at 0.25.⁶⁸ The evaluation report stated that offering additional measures that offer higher savings and providing more education about the installed measures could work

to improve increase cost-effectiveness if the pilot were implemented on a wider scale.⁶⁹ The program was considered to be well executed by the collaborating LDCs and successful in terms of targeting a section of the population who faced higher electricity costs.

Centrally delivered programs

\$400 million of the \$2.2 billion budget for the six-year Conservation First Framework was allocated for central services and programs delivered by the IESO. Programs delivered directly by the IESO have taken on a larger role recently because of direction received from the Ministry of Energy.⁷⁰

The IESO is centrally funding and delivering two programs/pilots from their allotted budget that launched in 2017: the Energy Performance Program for multi-site customers and the Whole Home Pilot, which is delivered by the province's gas utilities.⁷¹ The Energy Performance Program is discussed below, while the Whole Home Pilot, which combines electric and gas conservation measures for residential houses, is discussed in [Chapter 2](#).

Energy Performance Program (EPP) for multi-site customers

The IESO was directed by the Minister of Energy in June 2016 to develop and centrally deliver a new pay-for-performance (P4P) program that offers conservation incentives for customers that have facilities across multiple service territories.⁷² Under a pay-for-performance incentive mechanism, participants are rewarded for whole building energy performance through incentives based on verified performance set at a predetermined \$/kWh rate for savings.⁷³ This gives the customers choice and flexibility to implement capital and non-capital measures as long as they lead to energy savings.⁷⁴

Participants are rewarded for whole building energy performance through incentives.

The Energy Performance Program (EPP) launched in December of 2016 with a total budget of \$24 million over the course of the framework. As of June 2018, 162 facilities from nine different companies across Ontario in 42 LDC service territories have enrolled in the program. Participants include 45 schools, 14 office and retail buildings, two multi-unit residential buildings and 101 grocery stores.⁷⁵ In 2017, the IESO reported verified net energy savings of over 7.9 GWh from 39 of the participants⁷⁶, and indicates that the EPP is generating twice the savings for each dollar spent compared to the province-wide Retrofit Program, which is the CFF's most successful program. Almost 50% of the energy savings came from improved operational practices and did not require capital expenditures on new technology. Figure C.5 shows the estimated savings from different measures installed under the program in 2017.

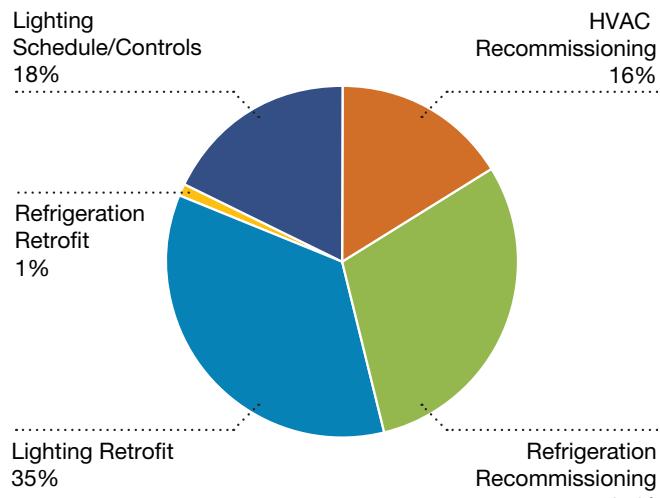


Figure C.5. Estimated savings from measures installed under the EPP.

Source: Independent Electricity System Operator, Program Year 2017 Evaluation Report: Energy Performance Program for Multi-site Customers by EcoMetric Consulting, LLC (IESO: Toronto, November 2018) at 24.

The IESO has indicated that this program has great potential beyond 2020 if it is expanded to more customers as it allows for deeper savings and encourages innovation by promoting whole facility energy conservation. There could be more customer participation if funding is made available beyond 2020, eligibility requirements are lowered to allow smaller customers and if the modeling incentive is increased.

Table C.3 lists the performance of centrally-delivered IESO programs for distribution-connected customers in 2017.⁷⁷

Table C.3. Performance of IESO only programs in 2017.

Programs	Net incremental 2020 annual energy savings (GWh)	Net incremental 2020 peak demand savings (MW)
Energy Performance Program	7.92	0.00
Whole Home Pilot	6.60	0.93

Source: Independent Electricity System Operator, information provided to the ECO (15 January 2019).

The central delivery of the Home Assistance Program and other programs

In December 2016, the Minister of Energy issued a direction that required LDCs to revise their CDM plans to ensure all customers had access to the province-wide CDM programs.⁷⁸ This suggested that, in the government's view, certain customer segments were not getting adequate access to conservation programs from all LDCs and therefore corrective action was required. LDCs had until May 1, 2017 to resubmit their CDM plans. Any province-wide programs not offered by LDCs were to be picked up for delivery by the IESO, as per the direction. The Directive also asked the IESO to create a budget from within its allotted CFF budget to deliver these programs and stated that the results from these IESO delivered programs would not count towards the LDC's targets.

In particular, the directive seemed intended to address the lowered level of availability and participation in the program for low-income customers (Home Assistance Program). Participation in the Home Assistance Program (HAP) had dropped by almost more than 50% between 2015 and 2016. It then picked up slightly in 2017 (36% increase between 2016 and 2017).⁷⁹ 22 more LDCs participated in HAP in 2017 compared to 2016, but 75% of the participation came from the five largest LDCs and one medium-size one.⁸⁰ Participants reported a high level of satisfaction, with 92% saying they were satisfied with the program.⁸¹ Delivery agents and community partners also echoed this sentiment.

However, the government remained concerned that the LDC-delivery model was not reaching all eligible low-income customers in the province. On August 4, 2017, the Minister issued another Directive to the IESO concerning the LDC delivery the program. The Direction stated that "there remains an opportunity to further improve the availability of and access to CDM programs targeted to the low-income customer segment through IESO delivery"⁸² and amended the Framework to mandate that the IESO centrally design, fund and deliver a province-wide low income program beginning January 1, 2018.

Though the Directive stated that the IESO may continue to allow an LDC to deliver the low-income program if it can demonstrate the commitment to serve the customer segment⁸³, the Home Assistance Program is now an IESO delivered CDM program. LDCs have the option to access funds to promote the program directly to its customers or it can engage the IESO's central HAP vendor to participate in the program's delivery.⁸⁴ Currently, there are four LDCs participating in promoting the IESO's delivery of the program, but no LDCs to date have been approved to engage with the IESO's vendor to deliver the program in their jurisdiction.⁸⁵

This issue reflects the long-standing tension between maximizing cost-effectiveness and making conservation support available to lower-income

This issue reflects the tension between maximizing cost-effectiveness and making conservation support available to lower-income customers.

customers (such programs generally have lower energy savings per dollar spent). This is because programs geared towards lower-income customers generally have lower energy savings per dollar spent. While the results of the first year of central delivery will not be available until 2019, several LDCs have noted to the ECO that the shift to central delivery may have been short-sighted on the part of the province. According to LDCs, the industry was delivering HAP to the best of its abilities under target and budget constraints and larger LDCs could have delivered in jurisdictions where smaller LDCs could not vs. the IESO taking over the whole program.⁸⁶ This change meant LDCs had to cancel their existing HAP vendor contracts when the IESO's central delivery vendor took over, creating confusion and delivery issues.

As of the time of writing this report, the Home Assistance Program is the only program that has been taken over by the IESO from all LDCs, however the IESO is now also filling some gaps in program availability for other programs in certain LDC service territories.⁸⁷ To date, the IESO has enrolled over 8,500 homes in its centrally managed HAP and around 3000 projects have been completed.⁸⁸

The increased role IESO is playing in central delivery of programs is the reason that the increases in budget (\$220 million) and target (0.4 TWh) reassigned from the Industrial Accelerator Program have been allocated to IESO centrally-delivered programs, and not to LDCs.

C.2.4 Individual LDC performance

LDCs continued to perform strongly in 2016 and 2017, with over 85% (59 of 68) already achieving 50% of

their allotted targets by the mid-term of the framework. 7 LDCs have already achieved over a 100% of their allotted 6-year targets.⁸⁹ Most LDCs that achieved 50% or more of their 6-year targets at the end of 2017 were eligible to receive a Mid-Term Incentive in 2018.⁹⁰ The IESO expects that the underperforming LDCs, especially those in more remote areas of the province, will catch up with their CFF goals as program activity accumulates in the later stages of the framework and equipment is transported to the locations seasonally.⁹¹

Factors that led to higher than average performance for specific LDCs include:

- Completion of large CHP projects⁹²
- Strong participation in the Coupon and Retrofit programs, driven by LDC promotion to customers
- Success with the Energy Manager Initiative, specifically for the large LDCs⁹³ (see the text box on Energy Managers in **Chapter 1** of this report)

Table C.4 lists LDCs' persistent energy savings until the end of 2017 and their progress to allocated CFF targets.

Table C.4. Individual LDC performance under the 2015-2020 Conservation First Framework as of December 31, 2017.

LDC	Net verified Persistent Energy Savings to 2020 (GWh)	Progress to Allocated Target (%)
Alectra Utilities*	998.2	62
Algoma Power Inc.	4.74	63
Atikokan Hydro Inc.	0.7	61
Attawapiskat Power Corporation	0.27	53
Bluewater Power Distribution Corporation	26.33	42
Brantford Power Inc.	36.44	67
Burlington Hydro Inc.	61.96	63
Canadian Niagara Power Inc.	23.99	84
Centre Wellington Hydro Ltd.	6.16	71
Chapleau Public Utilities Corporation	0.7	67
COLLUS PowerStream Corp.	11.63	69
Cooperative Hydro Embrun Inc.	1.38	77
E.L.K. Energy Inc.	6.66	41
Energy+ Inc.**	127.32	126
Entegrus Powerlines Inc.	73.7	96
EnWin Utilities Ltd.	80.97	54
Erie Thames Powerlines Corporation	20.21	73
Espanola Regional Hydro Distribution Corporation	1.94	80
Essex Powerlines Corporation	33.66	107
Festival Hydro Inc.	28.87	83
Fort Albany Power Corporation	0.24	71
Fort Frances Power Corporation	1.97	49
Greater Sudbury Hydro Inc.	31.34	90
Grimsby Power Incorporated	8.06	74
Guelph Hydro Electric Systems Inc.	102.23	103
Halton Hills Hydro Inc.	19.58	63
Hearst Power Distribution Company Limited	5.54	174
Hydro 2000 Inc.	0.71	52
Hydro Hawkesbury Inc.	4.77	60
Hydro One Networks Inc.	986.67	81
Hydro Ottawa Limited	276.09	70
InnPower Corporation	9.57	74
Kashechewan Power Corporation	0.28	54
Kenora Hydro Electric Corporation Ltd.	3.29	63
Kingston Hydro Corporation	19.28	56
Kitchener-Wilmot Hydro Inc.	88.15	83
Lakefront Utilities Inc.	7.42	61

Lakeland Power Distribution Ltd.	11.75	74
London Hydro Inc.	124.59	63
Midland Power Utility Corporation	12.01	111
Milton Hydro Distribution Inc.	35.16	78
Newmarket-Tay Power Distribution Ltd.	23.32	64
Niagara Peninsula Energy Inc.	43.75	59
Niagara-on-the-Lake Hydro Inc.	10.5	90
North Bay Hydro Distribution Limited	26.15	129
Northern Ontario Wires Inc.	3.58	83
Oakville Hydro Electricity Distribution Inc.	70.1	76
Orangeville Hydro Limited	10.38	73
Orillia Power Distribution Corporation	7.4	45
Oshawa PUC Networks Inc.	52.31	72
Ottawa River Power Corporation	7.15	82
Peterborough Distribution Incorporated	23.51	62
PUC Distribution Inc.	24.42	92
Renfrew Hydro Inc.	2	48
Rideau St. Lawrence Distribution Inc.	2.95	59
Sioux Lookout Hydro Inc.	1.77	48
St. Thomas Energy Inc.***	10.7	61
Thunder Bay Hydro Electricity Distribution Inc.	51.75	107
Tillsonburg Hydro Inc.	7	62
Toronto Hydro-Electric System Limited	981.95	63
Veridian Connections Inc.	81.43	53
Wasaga Distribution Inc.	5.82	92
Waterloo North Hydro Inc.	53.68	65
Welland Hydro-Electric System Corp.	10.34	41
Wellington North Power Inc.	2.21	37
West Coast Huron Energy Inc.	3.83	47
Westario Power Inc.	14.41	63
Whitby Hydro Electric Corporation	32.64	56
Total	4859.58	68

LDC has achieved less than 50% of target

LDC has achieved greater than 50 but less than 100% of target

LDC has achieved greater than 100% of target

*Note: As of September 2017, Horizon Utilities, Enersource and Powerstream merged to become Alectra Utilities Inc. The merged utility also purchased Hydro One Brampton, which became part of the new LDC. The new LDC's target is a culmination of all the merged LDCs' individual targets.

**Note: Energy+ Inc. is an amalgamation of Brant County Power and Cambridge and North Dumfries Hydro Inc. The new LDC's target is a culmination of all the merged LDCs' individual targets.

***Note: St Thomas Energy has now merged with Entegrus, but was still a separate LDC with its own target at the end of 2017.

Source: Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab "LDC Rankings"

C.3 Industrial Accelerator Program (IAP) for large customers

In addition to the oversight and collaboration with the LDCs in delivering the 2015-2020 Conservation First Framework, the IESO is mandated to deliver 1.3 TWh (this was originally 1.7 TWh) of energy efficiency savings from its larger customers (primarily industrial customers) who are directly connected to the high-voltage transmission network. The program that delivers these savings is the Industrial Accelerator Program (IAP).

The IAP is designed to help transmission-connected customers with financial incentives to implement major energy conservation projects in their facilities. There are currently four initiatives under this program (similar to the initiatives of the same names offered to smaller distribution-connected customers), which encourage investment in innovative capital projects and retrofits that help reduce electricity consumption and therefore save money for the customers:

- Retrofit
- Process and Systems, including small capital projects
- High Performance New Construction
- Energy Managers

Table C.5. Performance of Industrial Accelerator Program, 2016 and 2017.

Year	Net incremental 2020 annual energy savings (GWh)	Net incremental 2020 peak demand savings (MW)
2016	113.02	82.49
2017	101.00	11.5

Source: Independent Electricity System Operator, information provided to the ECO (8 August 2018); Independent Electricity System Operator, 2017 Report on Energy Efficiency Activities (Toronto: IESO, December 2018) at 6.

Verified results from the IAP have been lower than expected. By the end of 2017, the halfway point of the 2015-2020 framework, the IAP had only achieved 21.5% (280 GWh) of the amended 1.3 TWh target in three years. The IESO is currently consulting on several amendments to the IAP to bring the program in line with the LDC-delivered Process and Systems Upgrade (PSU) program. The PSU program changes are expected to increase customer participation, shorten project cycles and increase cost-effectiveness, so the same benefits could potentially help the IAP.⁹⁴

As discussed earlier in the chapter, the lower performance of the IAP has meant that the target for IAP has been reduced by 0.4 TWh, and reallocated to programs for distribution-connected customers. The IAP six-year budget has been correspondingly reduced from \$500 million to \$280 million.⁹⁵

C.4 IESO's demand response programs

Demand response is a specific category of conservation initiatives designed to reduce electricity use when the electricity system is under stress, often on days of system-wide peak demand (e.g., hot summer weekday afternoons or cold weekday evenings). Meeting peak demand is exceptionally expensive and drives a disproportionate share of system costs.

Meeting peak demand is exceptionally expensive and drives a disproportionate share of system costs.

Demand response is usually achieved by customers reducing or curtailing some share of their electricity use in response to signals from the system operator. Demand response is focused on delivering instantaneous reductions in peak demand (measured in MW), and usually delivers only negligible overall

electricity savings (because it is only activated for short periods, and some of the electricity use that is curtailed at these times may be shifted to other times). In contrast, the conservation programs described earlier in the chapter deliver both electricity savings and peak demand savings, but their primary metric is overall electricity savings.

Under the CFF, the responsibility for reducing peak demand through demand response initiatives is with the IESO. The IESO previously had a target of using demand response to meet 10% of provincial peak demand by 2025. However, in its latest Long-Term Energy Plan, the province stated that demand response capacity realized each year will depend on system needs and the competitiveness of demand response with other resources. In other words, the economic cost of demand response will be compared with electricity supply-side options, and there is no longer a specific target for how much demand response will be procured by action.⁹⁶

In 2016 and 2017, the IESO ran two initiatives to reduce peak demand: the annual demand response (DR) auction and the Capacity Based Demand Response (CBDR) program. The CBDR was discontinued in late 2018. The IESO also has demand response capacity available through peaksaver PLUS programs.⁹⁷

C.4.1 Annual Demand Response (DR) Auction

The IESO's Demand Response (DR) Auction, held annually in December, provides a competitive process by which potential DR providers offer to commit to reducing their consumption during hours of provincial peak demand and being compensated for that reduction, while being held to mostly the same performance obligations by the IESO as generators and other electricity market participants.⁹⁸

The Demand Response Auction has been successful in procuring demand response at lower prices. The most recent auction (held in December 2018 for the 2019 period) procured more DR than the target capacity, due to low prices (a 30% price decrease from the previous

The Demand Response Auction has been successful in procuring demand response at lower prices.

year's auction and a 43% price decrease from the first auction held in 2015).⁹⁹

Devices from the now-discontinued *peaksaver PLUS* program (a program that installed a programmable thermostat in Ontario homes and small businesses) that are still operational can be aggregated (e.g., by electric utilities) to participate in the DR auction. Several successful participants in the DR auction are residential DR, which may be based on aggregated *peaksaver PLUS* devices.¹⁰⁰ However, the amount of residential DR procured through the auction (13 MW in 2018) is much lower than the capacity of the former *peaksaver PLUS* program (164 MW).

C.4.2 Capacity Based Demand Response (CBDR)

The Capacity Based Demand Response (CBDR) Program was a transitional program for participants with contracts under a previous demand response program (Demand Response 3) that activated these contracted customers using market signals. This program was active in 2016 and 2017 and ended in October 2018. Expired CBDR contract capacity was rolled into the IESO DR auction target capacity for subsequent DR auctions.¹⁰¹

C.4.3 Integrating demand response into Market Renewal¹⁰²

With capacity need emerging from 2020 onwards and the first incremental capacity auction currently being targeted for as early as end of 2022, the IESO plans to evolve the 2019 DR auction by allowing more resources to compete to meet the emerging capacity needs.¹⁰³ Evolution of the DR auction will be staged, allowing both the IESO and market participants to continue to learn and improve our processes as capacity needs increase.¹⁰⁴ This staging will culminate

in the implementation of the incremental capacity auction design that IESO has been developing with stakeholders and is expected to be up and running by as early as the end of 2022.

Eventually it is envisioned that demand response providers, along with generators and importers, will compete in a capacity auction market (Incremental Capacity Auction) to meet Ontario's resource adequacy needs, under the IESO's Market Renewal initiative.

The IESO plans to engage with stakeholders on the proposed changes for the next DR auction through various working groups. The IESO is currently engaging stakeholders on how to integrate demand response into Market Renewal¹⁰⁵, and, specifically through the Demand Response Working Group, to evolve and improve the existing demand response in the IESO-administered markets.¹⁰⁶

C.4.4 Demand response results

Table C.6 lists the peak demand capacity provided by DR programs in 2016 and 2017. Unlike the savings from conservation programs presented earlier, these savings from demand response initiatives do not represent actual reductions in peak demand, they represent the amount of demand response procured (except for the now discontinued peaksaver PLUS program).¹⁰⁷ This is the potential for peak demand reduction – how much peak demand could be reduced if all of the demand response resources under contract are activated.

Actual activations of demand response resources depends on the system need (see next section). In addition, DR participants may not be able to reduce electricity use by the full contracted amount if called upon (although the contracts for DR participants are structured such that participants may incur non-performance charges for not meeting their performance obligations) – the results from 2017 activations suggest that roughly 75-85% of contracted/procured demand response will be delivered when activated.

Table C.6. Demand Response capacity provided in 2016 and 2017.

Program	2016 contracted peak demand reduction (MW)	2017 contracted peak demand reduction (MW)
IESO Capacity Based Demand Response	159.0	159.0
IESO Demand Response Auction	391.5	455.2
IESO Demand Response Pilot	69.0	25.9
peaksaver Plus ¹⁰⁸	163.8	164.0

Source: Independent Electricity System Operator, information provided to the ECO (8 August 2018 and 15 January 2019).

C.4.5 DR activations in 2016 and 2017

The value of demand response as a resource was demonstrated in September 2017, when Ontario experienced an extended fall heatwave¹⁰⁹ and electricity demand spiked (both September 25 and September 26 were in the five days of the year with the highest system-wide peak demand).¹¹⁰ The CBDR program was activated twice during this heatwave where on each occasion the IESO activated over 150 MW of DR and over 110 MW was delivered (roughly 75%).¹¹¹ The province's peaksaver PLUS program, which was discontinued at the end of 2017, was also activated on these two days. On both occasions, peaksaver PLUS curtailed approximately 175 MW of peak demand, slightly higher than predicted.¹¹² This event was the only need-based activation of DR in 2017. There was also one DR activation in 2016 that lasted for 4 hours and had a 75% compliance rate from participants.¹¹³

The value of demand response as a resource was demonstrated in September 2017, when Ontario experienced an extended fall heatwave.

Demand response resources procured through the DR auction were not activated in 2016 or 2017, which indicates that electricity market prices never went high enough for the IESO to call on DR. In 2017, the IESO did initiate 7 test activations to confirm the availability of these resources, and approximately 85% of activated capacity was delivered.¹¹⁴

C.5 Electricity conservation spending

The 2013 Long-Term Energy Plan had outlined a total budget of \$2.2 billion for the CFF (LDC spending and IESO spending), \$0.4 billion for demand response initiatives, and \$0.5 billion for the IAP.¹¹⁵ Total spending on electricity conservation initiatives which

Total spending on electricity conservation was approximately 2% of the annual costs of running Ontario's \$21 billion electricity system.

includes spending on the CFF, the IAP, and DR was roughly \$391 million in 2016 and \$541 million in 2017¹¹⁶. This represents approximately 2% of the annual costs of running Ontario's \$21 billion electricity system. Most of this spending is for CFF and IAP and is recovered through the Global Adjustment charge, accounting for roughly 3.78% of the Global Adjustment in 2016 and 3.25% in 2017.¹¹⁷ Demand response spending, on the other hand, is funded through the IESO's Wholesale Market Service Charge.¹¹⁸

Figure C.6 shows the amount and percentage of conservation costs attributed to CFF programs, the Industrial Accelerator program, and demand response initiatives, respectively, in 2016 and 2017.

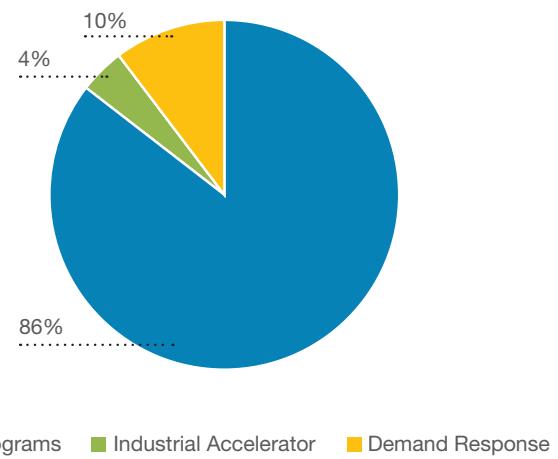


Figure C.6. Percentage of conservation costs for 2016 and 2017 (collective).¹¹⁹

Source: Independent Electricity System Operator, information provided to the ECO (15 January 2019); Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab "Province Wide Progress"; Independent Electricity System Operator, 2016 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2017) at Tab "LDC Rankings".

As Figure C.6 shows, spending on CFF programs dominates the overall conservation budget. In 2016 and 2017 together, \$797 million was spent on the CFF programs, which includes the programs delivered under the 2015-2020 framework and programs being completed from the 2011-2014 Conservation and Demand Management Program.¹²⁰ The CFF spending includes incentives to participants of conservation programs, LDC program administrative costs, and the IESO's Central Services (which include LDC performance incentives, program evaluations, market research and LDC Innovation Pilot funding). See Figure C.7 for a breakdown of CFF spending per expense category.

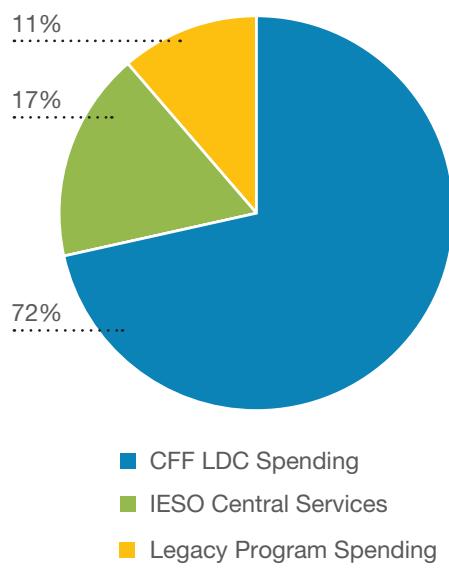


Figure C.7. Spending on CFF Programs by expense category

Note: The Mid-Term Incentive is part of the IESO Central Services budget.
Source: Independent Electricity System Operator, information provided to the ECO (19 February 2019).

One of the major expenditures that took place at the end of 2017, halfway through the CFF, is the payment of the Mid-Term Incentive (MTI) to eligible LDCs, as discussed in the individual LDC performance section. According to the IESO-LDC Energy Conservation Agreement, LDCs that achieved 50% or more of its individual or joint CDM target is eligible to receive this

incentive, which is a portion of its Achieving Target Incentive.¹²¹ This incentive is paid from the Central Services portion of the total CFF budget.¹²² 61 LDCs were eligible for the MTI in 2018, for a total amount of \$68 million.¹²³

At the end of 2017, the province's LDCs had spent 33% of their \$1.8 billion CFF budget in the first half of the framework, but had achieved 69% of their aggregate target.¹²⁴ This is due in part to stronger program results and cost-effectiveness than expected. However, it is also due to the fact that conservation projects completed in 2015 or later that were initiated through 2011-2014 legacy programs are counted towards the 2015-2020 target, but were funded from the previous conservation framework, not the CFF budget.

Since most of the energy savings in 2015 came from the 2011-2014 legacy programs, most of the spending also came from the previous CDM framework. The Province's LDCs started 2016 having spent only 1.3% of their \$1.8 billion CFF budget. Some conservation spending from the pre-CFF framework continued in 2016, although at a lower amount (\$90.15 million).¹²⁵ The IESO notes that it continues to have payment obligations from the legacy framework (primarily incentive payments to customers as projects are completed) that do not have a final deadline.¹²⁶ The end result of this legacy spending is that, as the Ontario Energy Board (OEB) has noted, this has put LDCs in an advantageous position since they now have a larger than projected budget for the rest of the framework.

In total, only \$570 million of the \$797 million spent in 2016 and 2017 on CFF conservation programs comes from the 2015-2020 LDC CFF budget of \$1.8 billion. Figures C.8, C.9 and C.10 break down this spending in more detail.

Figure C.8 shows the breakdown of the \$570 million spending from the LDC budget by type of expense in 2016 and 2017 (collectively).

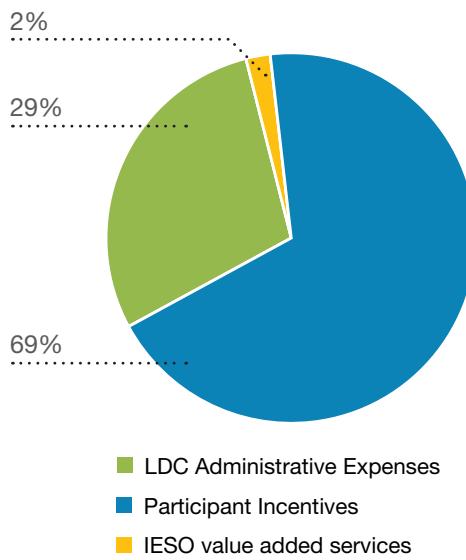


Figure C.8. 2016-17 Conservation First electricity conservation program spending by type of expense.¹²⁷

Source: Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018) at 11-13, Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab "Province Wide Progress".

Figure C.9 presents spending in the different sector portfolios in 2016 and 2017 together. Spending is in line with savings, with the business programs using up more than 50% of the budget given its contribution to savings.

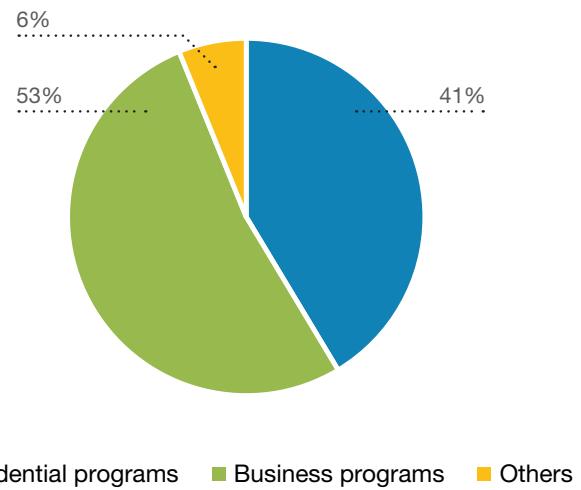


Figure C.9. CFF Spending by program portfolio 2016-2017.

Source: Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab "Province Wide Progress".

Figure C.10 presents the individual programs that had the highest spending associated with them in 2016 and 2017 together. The spending numbers generally align with the electricity savings numbers in Figure C.3, which is expected.

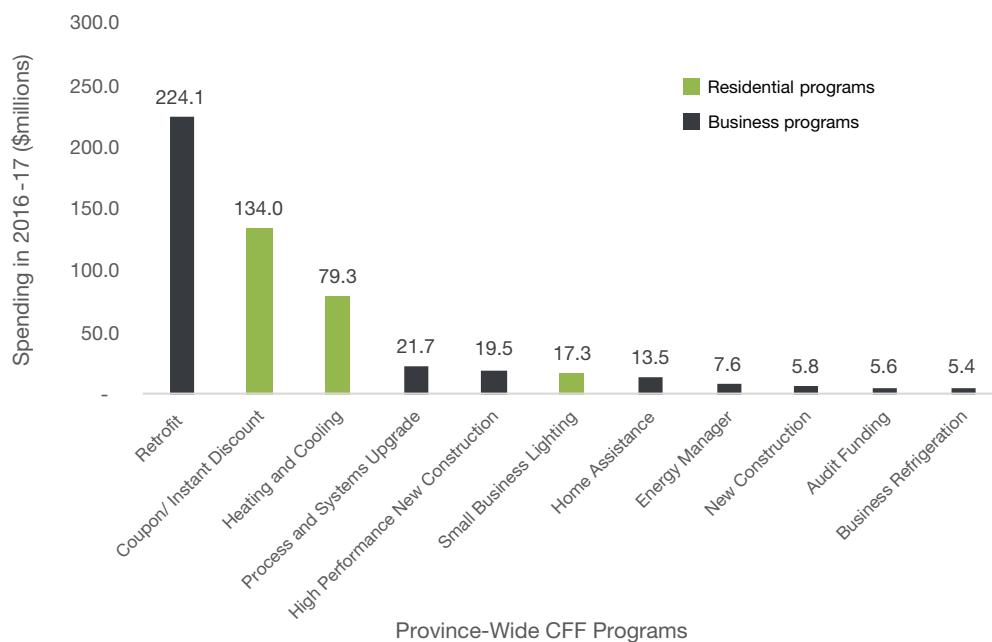


Figure C.10. Province-wide programs with the highest spending in 2016-17.

Note: The Instant Discount Program replaced the Coupon Program mid-2017.

Source: Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018) at 16, Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab "Province Wide Progress".

Province-wide, the CFF budget is expected to be sufficient to achieve the 2020 target, and to be sufficient to meet customer demand for existing conservation programs through 2020 (in other words, programs would not need to be shut down early due to lack of budget). However, because budgets are assigned individually to each LDC, some LDCs who have been very successful (and thus have paid out larger incentives to participating customers) may run out of funds before the end of 2020. This issue was raised in the Mid-Term Review (see [Chapter 2](#) of this report) and the IESO and LDCs are looking at how to reallocate budgets to address this concern.

C.6 Program cost-effectiveness

Except for the Home Assistance Program, all province-wide conservation programs are required to be cost-effective to be eligible for delivery in the province. Programs have to pass two separate cost-effectiveness tests, the Total Resource Cost (TRC) and the Program Administrator Cost (PAC), which compare lifetime costs of the programs from two different angles.¹²⁸ For both those tests, a ratio of greater than 1 indicates that the benefits from delivering that program are higher than the associated costs and therefore the program is beneficial for the province (TRC test), and for electricity ratepayers (PAC test).

One or more programs can be cost-ineffective if other cost-effective programs add up to bring the portfolio to a cost-effective ratio greater than 1.

Under the CFF, the entire program portfolio of each LDC has to be cost-effective, so one or more programs can be cost-ineffective if other cost-effective programs add up to bring the portfolio to a cost-effective

ratio greater than 1.¹²⁹ In the CFF, the TRC also includes a 15% adder to include non-energy benefits such as greenhouse gas reductions. As discussed in [Chapter 2](#), the IESO is working on updating the cost-effectiveness calculations and the TRC adder to more accurately measure and value greenhouse gas emissions reductions, non-energy benefits, and avoided electricity supply costs. These updates were not applied to the evaluation of 2017 results.

Table C.7 lists cost-effectiveness of the various program portfolios under CFF from 2015 to 2017. Also shown is the levelized cost of delivery – how much electricity ratepayers pay for each unit of electricity saved.

Table C.7. Cost-effectiveness of province-wide conservation programs for 2015, 2016 and 2017.

Program	Total Resource Cost Test (benefit:cost Ratio)			Program Administrator Cost Test (benefit:cost Ratio)			Levelized Cost of Delivery (c/kWh)		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Residential									
Coupons	11.21	18.56	23.23	2.39	4.67	5.30	2.35	1.23	1.13
Heating and Cooling	1.8	1.36	1.27	2.17	2.05	2.5	6.31	5.05	4.3
New Construction	1.26	0.27	0.34	1.88	0.61	0.78	4.21	14.08	13.63
Instant Discount (launched mid-2017)	n/a	n/a	14.95	n/a	n/a	10.46	n/a	n/a	0.59
Residential portfolio	3.59	4.94	7.27	2.2	3.4	5.37	3.63	1.92	1.22
Home Assistance	1.01	0.94	0.77	0.88	0.81	0.67	8.87	7.75	9.54
Business and Industrial									
Audit Funding	1.07	2.04	2.44	1.5	0.59	3.22	3.72	10.97	1.62
Retrofit	1.04	1.15	1.26	2.68	3.07	4.14	2.4	2.14	1.86
Small Business Lighting	0.77	1.06	2.07	0.7	1.11	2.35	10.65	6.93	3.65
High Performance New Construction	2.27	3.44	3.07	2.51	6.13	5.94	3.67	1.73	1.44
Existing Building Commissioning	0.21	1.37	0.63	0.18	1.19	0.46	36.04	4.15	12.52
Business Refrigeration	n/a	n/a	1.69	n/a	n/a	1.47	n/a	n/a	4.96
Business portfolio	1.05	1.23	1.45	2.28	3.02	3.99	3.5	2.24	1.94
Process and Systems Upgrade	0.85	0.88	0.54	1.2	1.95	1.61	5.25	0.04	5.13
Energy Managers	0.72	2.57	0.89	1.52	7.21	2.66	4.7	0.01	2.4
Monitoring and Targeting	0.08	n/a	n/a	0.08	n/a	n/a	48.25	n/a	n/a
Industrial portfolio	0.82	1.2	0.6	1.23	2.6	1.75	5.2	3	4.48
Total	1.29	1.96	2.54	1.99	2.93	4.07	3.5	2.27	1.75

Source: Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018 at 14; , Independent Electricity System Operator, information provided to the ECO (15 January 2019); “2017 Evaluation Reports”, online: Independent Electricity System Operator <www.ieso.ca/en/Sector-Participants/Conservation-Delivery-and-Tools/Evaluation-Measurement-and-Verification> [Accessed 8 February 2019].

The table shows that overall, the CFF remains cost-effective in terms of the PAC and the TRC. Since the first year of the program, cost-effectiveness has improved on all counts. Electricity conservation programs delivered more than two dollars of benefits for every dollar spent in 2017, as the TRC improved from 1.29 to 2.54 between 2015 and 2017; while the PAC, which dropped slightly in 2015 compared to the 2011-2014 CDM Framework¹³⁰, has improved from 1.99 to 4.07.

Cost-effectiveness has improved on all counts.

While the improvement in the overall cost-effectiveness can be attributed to the ramp up of programs under CFF in 2016, the ECO notes that one of the main factors affecting the cost-effectiveness numbers is the high TRC and PAC of the Coupon Program. The TRC from the Coupon Program has been in the double-digits and the PAC has almost doubled within one year. The TRC and PAC values are affected by the higher electricity savings of these programs in 2016 and 2017, discussed earlier. The cost-effectiveness is also very high, due to the lower per-unit incentives paid to customers (for PAC calculations), and the long lifetime of LEDs. Without the high cost-effectiveness numbers of the Coupon Program, the Residential portfolio would have a TRC of 1.28 and a PAC of 1.97 in 2016, still positive, but significantly lower than the portfolio results with the Coupon Program included.¹³¹

Most of the business programs saw an improvement in cost-effectiveness in 2016, with some of the significant changes highlighted below:

- Retrofit, which is the most successful CFF program to date, remains cost effective in all measures. Despite its success, the program has seen falling participation since 2015, especially in smaller projects.¹³² This has been flagged by LDCs as the low-hanging fruits run out. While participation has fallen overall since 2015, energy savings have increased because of larger projects (over 150 MWh).¹³³

- The Small Business Lighting Program has seen considerable improvements in cost-effectiveness since 2015. The program also saw a 212% increase in participation in 2017.¹³⁴
- The Business Refrigeration Program's cost-effectiveness numbers were driven by ECM motors, which suggests that the program should continue focusing on that measure.¹³⁵
- The Audit Funding program saw improved cost-effectiveness numbers because of a large increase in per audit energy savings and increased program participation.¹³⁶
- The New Construction Program on the residential portfolio was not cost-effective under TRC or PAC in 2016 mainly because of reduced participation under CFF as LDCs have allocated smaller budgets to this program. In addition, based on current market baseline, the current program measures also delivered lower per-unit savings.¹³⁷ Levelized unit electricity cost (LUEC) numbers increased because program costs only decreased 13% from 2015 but net verified savings decreased 74% during the same time.¹³⁸
- The Existing Building Commissioning Program saw significant improvements in TRC, PAC and LUEC in 2016 due to lower reported program administration costs. Given the long project cycles for the Existing Building Commissioning Program, several projects were initiated under the 2011-2014 legacy framework that would not have completed by December 31, 2015. As a result, these projects continued into the CFF through the Extension Agreement mechanism.¹³⁹
- The Process and Systems Upgrade program continued to be cost-ineffective at the TRC level, specifically for the fact that it has the highest free ridership at an average of 22%.¹⁴⁰ This is primarily because large customers have indicated that they would have undertaken large BMG projects regardless of program incentives being available.¹⁴¹

- The M&T Program did not have any projects completed in 2016 because of its longer completion and evaluation time.¹⁴²

The leveled cost of delivery improved significantly from 3.5 c/kWh in 2015 to 1.75 c/kWh in 2017 (this value is from the PAC perspective; the leveled cost from the TRC perspective would be somewhat higher). This cost of saving a unit of electricity can be compared to the cost of supplying a unit of electricity from generation, which is much higher (11.5 c/kWh¹⁴³). This highlights that the value of conservation to the province compared to generation has improved even more. Conservation still remains

the most cost-effective form of meeting Ontario's electricity needs, especially at times of high demand. This is discussed in more detail in [Chapter 2](#) of this report.

Conservation still remains the most cost-effective form of meeting Ontario's electricity needs, especially at times of high demand.

Table C.8 lists the 2017 cost-effectiveness of programs that are not LDC-delivered, such as the Industrial Accelerator Program and the IESO's centrally delivered programs.

Table C.8. 2017 Cost-Effectiveness of non-LDC programs.

Program	Total Resource Cost	Program Administrator Cost	Levelized Cost of Delivery (c/kWh)
Industrial Accelerator Program	3.72	3.22	2.16
Energy Performance Program	1.67	3.96	1.08
Whole Home Program	0.55	0.66	11.21

Note: Whole Home Program cost-effectiveness was calculated over a 13-month period, from June 2017 through to end of June 2018.

Source: Independent Electricity System Operator, 2017 Report on Energy Efficiency Activities (Toronto: IESO, December 2018) at 8; Independent Electricity System Operator, information provided to the ECO (15 January 2019).

Combining the results of all conservation programs except demand response, 2017 programs had a TRC ratio of 2.54, a PAC ratio of 3.88, and a leveled unit cost of 1.83 cents per kilowatt-hour.¹⁴⁴

Demand response initiatives are not subject to formal cost-effectiveness screening, however, the cost that IESO has been paying for DR has been steadily dropping, with the shift to a market auction. The IESO launched its first DR auction in December 2015, where

DR was procured for the summer commitment period (May–October 2016) and the winter commitment period (November 2016–April 2017). A subsequent auction was held in December of 2016. The clearing price for the 2015 auction was 11% less than the historical contract cost from the DR 3 program, and subsequent auctions have seen falling prices. The average price in the most recent (2018) auction was 43% lower than the first auction in 2015.¹⁴⁵

Endnotes

1. Conservation programs are funded through the Global Adjustment charge, while demand response initiatives are funded through Wholesale Market Service charges.
2. Independent Electricity System Operator, 2017 Report on Energy Efficiency Activities (Toronto: IESO, December 2018) at 6.
3. "IESO 2017 Year End Data", Independent Electricity System Operator <www.ieso.ca/Corporate-IESO/Media/Year-End-Data/2017>. [Accessed 8 February 2019]
4. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018) at Tab: Province Wide Progress; Independent Electricity System Operator, information provided to the ECO (19 February 2019).
5. "IESO 2017 Year End Data", Independent Electricity System Operator <www.ieso.ca/Corporate-IESO/Media/Year-End-Data/2017>. [Accessed 8 February 2019]
6. Based on the number of LDCs whose results the IESO reported at the end of 2017. This number will decrease to 67 with the merger of St Thomas Energy and Entegrus.
7. Directive from the Ontario Minister of Energy to the Ontario Power Authority, re: 2015-2020 Conservation First Framework (March 31, 2014).
8. For a comparison between the 2015-2020 Conservation First Framework and the 2011-2014 Conservation and Demand Management Framework, see Environmental Commissioner of Ontario, Every Joule Counts: Ontario's Energy Use and Conservation Year in Review (Toronto: ECO, August 2017) at 82.
9. While the original target was 7 TWh, it was amended in 2017 to add 0.4 TWh from the IAP target.
10. Directive from the Ontario Minister of Energy to the Ontario Power Authority, re: 2015-2020 Conservation First Framework (March 31, 2014).
11. Independent Electricity System Operator, "Target and Budget Allocation Methodology" (presentation, 16 December 2014) slide 15, online <www.ieso.ca/-/media/Files/IESO/Document-Library/conservation/LDC-toolkit/LDC-Target-and-Budget-Allocation-Methodology-Summary-20141216.pdf?la=en>.
12. Directive from the Ontario Minister of Energy to the Ontario Energy Board re: 2015-2020 Conservation First Framework (March 31, 2014).
13. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: 2015-2020 Conservation First Framework, and Delivery of Programs under the Conservation First Framework and the Industrial Accelerator Program (December 16, 2016).
14. Independent Electricity System Operator, "Target and Budget Allocation Methodology" (presentation, 16 December 2014) slide 18, online <www.ieso.ca/-/media/Files/IESO/Document-Library/conservation/LDC-toolkit/LDC-Target-and-Budget-Allocation-Methodology-Summary-20141216.pdf?la=en>.
15. Programs are approved by the IESO and the "duplication test" rules have been amended to encourage collaboration and local/regional program applications.
16. 2015-2020 IESO-LDC Energy Conservation Agreement (2014), Section 4.5.
17. Ibid, Section 5.4.
18. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Report Summary".
19. Originally reported results were 2015 persistent net energy savings of 1117 GWh and 2016 persistent net energy savings of 1154 GWh.
20. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: Reallocation of Targets from the Industrial Accelerator Program to 2015-2020 Conservation First Framework (February 8, 2018).
21. Independent Electricity System Operator, information provided to the ECO (8 August 2018).
22. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Report Summary".
23. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
24. Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018) at 20.
25. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
26. Independent Electricity System Operator, information provided to the ECO (7 August 2018). One of the main factors that led to this change was the high administrative effort and cost associated with running and managing the program for the IESO, the fulfillment agent and for the retailers. There was also evidence of customer confusion with both the IESO and the LDC providing coupons by mail and online and customers were also required to print coupons to use in-store which was a barrier to participation.
27. Independent Electricity System Operator, Evaluation of 2017 Save On Energy Residential Province Wide Programs by Cadmus (Toronto: IESO, November 2018) at 4. PAC for the Coupon program is 5.30 vs. 10.46 for the Instant Discount program.
28. Independent Electricity System Operator, 2017 Report on Energy-Efficiency Activities (Toronto: IESO, December 2018) at 4.
29. Independent Electricity System Operator, Volume 1: Final PY2016 Evaluation of Consumer Reports by Cadmus (Toronto: IESO, October 2017) at 11-12.
30. Ibid at 58.
31. Environmental Commissioner of Ontario, Restoring Balance: A Review of the First Three Years of the Green Energy Act (Toronto: ECO, June 2012) at 14.
32. Independent Electricity System Operator, 2017 Report on Energy-Efficiency Activities (Toronto: IESO, December 2018) at 59.
33. Independent Electricity System Operator, Volume 1: Final PY2016 Evaluation of Consumer Reports by Cadmus (Toronto: IESO, October 2017) at 20.
34. Independent Electricity System Operator, Evaluation of 2017 Save on Energy Residential Province Wide Programs by Cadmus (Toronto: IESO, November 2018) at B-164.
35. Ibid at Appendix C.
36. Ibid at C-204.
37. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".

38. Independent Electricity System Operator, information provided to the ECO (15 January 2019).
39. Independent Electricity System Operator, information provided to the ECO (8 August 2018).
40. Independent Electricity System Operator, Volume 1: Final PY2016 Evaluation of Consumer Reports by Cadmus (Toronto: IESO, October 2017) at 13.
41. Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018) at 20 ; Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
42. Independent Electricity System Operator, Evaluation of 2017 Business Programs by Nexant (Toronto: IESO, November 2018) at 26.
43. Ibid.
44. Independent Electricity System Operator, information provided to the ECO (8 August 2018).
45. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
46. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
47. Independent Electricity System Operator, Evaluation of 2017 Business Programs by Nexant (Toronto: IESO, November 2018) at 6.
48. Ibid.
49. Ibid at 7.
50. Ibid.
51. Independent Electricity System Operator, Program year 2017 Evaluation Report: Conservation First Framework Industrial Programs (Toronto: IESO, November 2018) at 34.
52. For more information about CHP projects, please see The Environmental Commissioner of Ontario, Every Joule Counts: Ontario's Energy Use and Conservation Year in Review (Toronto: ECO, August 2017) at 91.
53. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: Amendments to Ministerial Directions Arising from the Long-Term Energy Plan 2017 (26 October 2017).
54. Independent Electricity System Operator, Program year 2017 Evaluation Report: Conservation First Framework Industrial Programs (Toronto: IESO, November 2018) at 74.
55. Various LDCs, information provided to the ECO (June- August 2018).
56. Independent Electricity System Operator, Program year 2017 Evaluation Report: Conservation First Framework Industrial Programs (Toronto: IESO, November 2018) at 75.
57. Independent Electricity System Operator, Program year 2017 Evaluation Report: Conservation First Framework Industrial Programs (Toronto: IESO, November 2018) at 76.
58. Independent Electricity System Operator, information provided to the ECO (15 January 2019).
59. Independent Electricity System Operator, 2017 Report on Energy-Efficiency Activities (Toronto: IESO, December 2018) at 4. The IESO Conservation Fund, which has an annual budget of \$9.5 million, has been running since 2005 to support innovation energy projects across the province. To date, it has funded over 200 projects run by LDCs, technology companies, consulting firms, universities and colleges and the public sector. Funds are offered to initiatives that are piloting innovating conservation technologies to try and bring about large-scale market transformation.
60. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
61. Ibid.
62. CustomerFirst, information provided to the ECO (15 June 2018).
63. Independent Electricity System Operator, Home Energy Assessment and Retrofit Pilot Impact and Process Evaluation by Cadmus (Toronto: IESO, November 2018) at 1.
64. Ibid.
65. Ibid at 3.
66. Ibid at 19
67. Ibid at 6.
68. Ibid at 39.
69. Ibid at 35-37.
70. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: Delivery of Conservation and Demand Management Programs to the Low-Income Customer Segment (4 August 2017)
71. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: Upgrades to Existing Renewable Projects, Conservation First Framework and Support Programs (10 June 2016).
72. Ibid.
73. Independent Electricity System Operator, "Engagement Webinar: Multi- Distributor Customer Pay-for-Performance Program Draft Design"(presentation 21 July 2016) slide 5, online <www.ieso.ca/-/media/Files/IESO/Document-Library/engage/p4p/P4P-20160715-Program-Design.pdf?la=en>.
74. Ibid slide 6.
75. Independent Electricity System Operator, information provided to the ECO (19 February 2019).
76. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab "Province Wide Progress".
77. Independent Electricity System Operator, information provided to the ECO (15 January 2019).
78. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: 2015-2020 Conservation First Framework, and the Delivery of Programs under the Conservation First Framework and the Industrial Accelerator Program (16 December 2016).
79. Independent Electricity System Operator, Evaluation of PY2017 Home Assistance Program by Cadmus (Toronto: IESO, November 2018) at 12.
80. Ibid.
81. Ibid at 50.

82. Directive from the Ontario Minister of Energy to the Independent Electricity System Operator re: 2015-2020 Conservation First Framework and Partnering with the Green Ontario Fund; Delivery of Conservation and Demand Management Programs to the Low-Income Customer Segment (4 August 2017).
83. Ibid.
84. Independent Electricity System Operator, information provided to ECO (8 August 2018).
85. Ibid.
86. Various LDCs, information provided to the ECO (June- August 2018).
87. Independent Electricity System Operator, information provided to ECO (15 January 2019).
88. Ibid.
89. Independent Electricity System Operator, 2017 Final Verified Annual LDC CDM Program Results Report (Toronto: IESO, September 2018), tab “Province Wide Progress”.
90. Six LDCs have not achieved 50% of their targets but will be receiving MTIs because they are part of a joint plan that has achieved 50% or more of the aggregated target under the joint plan or because they have achieved 50% or more of their achievable potential less any target allocated to pay-for-performance. Three additional LDCs have achieved 50% of their targets but have postponed MTI payments until after 2018 final results are verified (Source: Independent Electricity System Operator, information provided to the ECO (19 February 2019)).
91. Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018) at 20
92. As of July 1 2018, CHP is no longer eligible under CFF.
93. Independent Electricity System Operator, 2017 Report on Energy-Efficiency Activities (Toronto: IESO, December 2018) at 8.
94. Independent Electricity System Operator “Industrial Accelerator Program: Overview of Proposed IAP Changes” (presentation, 19 November 2018), online <www.ieso.ca/-/media/Files/IESO/Document-Library/IAP/Overview-of-Proposed-IAP-Changes-20181119.pdf?la=en>.
95. Independent Electricity System Operator, information provided to the ECO (8 August 2018).
96. Independent Electricity System Operator, information provided to the ECO (15 January 2019).
97. For more information on the cancellation of the peaksaver PLUS program, see the Environmental Commissioner of Ontario, Every Joule Counts, Ontario’s Energy Use and Conservation Year in Review (Toronto: ECO, August 2018) at 100.
98. Interested DR providers have to apply to participate in advance of an auction period and meet certain qualifications; including meeting certain capacity thresholds and submitting a DR auction deposit; before being accepted. The IESO processes applications to determine clearing prices and quantities and then publish post-auction reports confirming the participants for the next auction. There are two commitment windows for each annual auction, summer (May 1 to October 31) and winter (Nov 1 to April 30) and participants can apply to one or both (separate applications) depending on their abilities. For more information on how this process is set up, please see Independent Electricity System Operator, Market Manual 12, Demand Response Auction, Issue 6.0 (Toronto: IESO, March 2017) at 12-18
99. Independent Electricity System Operator, information provided to the ECO (15 January 2019).
100. Independent Electricity System Operator, information provided to the ECO (8 August 2018). Since the IESO cannot track installation at contributor level, there is no confirmation at this point in time if the devices are participating in DR auction process.
101. Independent Electricity System Operator, information provided to the ECO (19 February 2019).
102. Ibid.
103. Independent Electricity System Operator, “Meeting Ontario’s Capacity Needs after 2020” (presentation at IESO Stakeholder Advisory Committee, 14 February 2019) at 2.
104. Ibid at 3.
105. For more information, see Environmental Commissioner of Ontario, Making Connections: Straight Talk about Electricity in Ontario, 2018 Energy Conservation Progress Report, Volume One (Toronto: ECO, April 2018) at 270.
106. The IESO is currently engaging DR stakeholders through a number of forums such as the DR Working Group, the Market Renewal Working Group and the Incremental Capacity Auction Stakeholder Engagement process. The DR Working Group is working on near-term matters aligned with the Market Renewal Initiative, such as improving flexibility and availability of hourly demand response. All DR stakeholders are active in developing the respective high-level market designs that will all become part of the entire Market Renewal initiative. The IESO expects that the high-level designs relevant to DR will be completed by Q3 of 2018 to Q2 of 2019.
107. During the evaluation of the peaksaver PLUS program, the IESO would conduct a randomized control trial where two random samples would be selected across the province and one would see an activation while the other would not. Load impacts differences between the two groups would be used for the program’s evaluation. For more information, see Independent Electricity System Operator, peaksaver PLUS Program 2014 Load Impact Evaluation by Nexant (Toronto: IESO, August 2015) at 6; Independent Electricity System Operator, information provided to the ECO (15 January 2019).
108. Estimated peak demand reduction capacity based on program evaluation. Actual demand response provided when called in September 2017 was slightly higher (175 MW).
109. “Heatwave continues this week as Toronto sets weather record”, BlogTO: online <www.blogto.com/city/2017/09/heatwave-toronto-weather-record-september/>. [Accessed 11 February 2019]
110. “Global Adjustment and Peak Demand Factor”, Independent Electricity System Operator: online <www.ieso.ca/en/Sector-Participants/ Settlements/Global-Adjustment-and-Peak-Demand-Factor>. [Accessed 11 February 2019]
111. Ibid
112. Ibid.
113. Independent Electricity System Operator, information provided to the ECO (31 March 2018).
114. Independent Electricity System Operator, information provided to the ECO (8 August 2018).
115. Independent Electricity System Operator, “Target and Budget Allocation Methodology: Conservation First Framework LDC Toolkit Final V2” (IESO LDC toolkit, 16 December 2014), slide 10. In 2017, the budgets were amended to \$2.42 billion for CFF and \$0.28 for IAP when targets were moved.

116. Independent Electricity System Operator, information provided to the ECO (19 February 2019).

Spending (millions \$)	2016	2017	Total
CFF LDC Spending	206.28	363.78	570.06
IESO Central Services	27.12	42.18	69.3
Legacy Framework spending	90.15	0	90.15
Mid-Term Incentive	0	67.6	67.6
Industrial Accelerator Program	22.5	16.7	39.2
Demand Response	45.4	50.8	96.2
Total	391.45	541.06	932.51

117. According to Independent Electricity System Operator, information provided to the ECO (8 August 2018), Global Adjustment recovery for conservation spending in 2016 is \$467.1 million. Total GA in 2016 was \$12.3 billion. According to Independent Electricity System Operator, information provided to the ECO (15 January 2019), recovery for conservation spending in 2017 was \$364 million, total GA in 2017 was \$11.2 billion. The amounts recovered through the Global Adjustment each year do not exactly match conservation spending for the year, due to a lag time of several months.

118. Independent Electricity System Operator, information provided to the ECO (8 August 2018).

119. See table in endnote 115. CFF spending includes CFF LDC spending, IESO central services, legacy framework spending and Mid-Term Incentives. Independent Electricity System Operator, information provided to the ECO (8 August 2018 and 15 January 2019).

120. For more information on the different types of programs, see Environmental Commissioner of Ontario, Every Joule Counts: Ontario's Energy Use and Conservation Year in Review (Toronto: ECO, August 2017) at 85.

121. 2015-2020 IESO-LDC Energy Conservation Agreement (2014), section 4.2c. Also see endnote 91.

122. Independent Electricity System Operator, "Target and Budget Allocation Methodology: Conservation First Framework LDC Toolkit Final V2" (IESO LDC toolkit, 16 December 2014), slide 10.

123. Independent Electricity System Operator, information provided to the ECO (15 January 2019)

124. See table in endnote 115.

125. For a further breakdown of the spending categories for the legacy programs, see Independent Electricity System Operator, 2016 Annual Verified Local Distribution Company Conservation and Demand Management Program Results Report (Toronto: IESO, March 2018) at 13. According to a response from the IESO to an ECO information request, there is a notable proportion of conservation spending in 2016 from legacy (pre-CFF) funds due to the Extension Agreements that LDCs were permitted to undertake in order to fund certain projects originating from the legacy framework, and provide a smooth transition for customers between the two frameworks. The Extension Agreements were developed as an option for LDCs to fund some projects that originated under the 2011-2014 framework, and were not yet completed or expected to have been completed by December 31, 2015.

126. Independent Electricity System Operator, information provided to the ECO (15 January 2019)

- 127.

Category of spending	\$
Participant Incentives	392,698,843.00
LDC Administrative Expenses	165,267,367.00
IESO value added services	12,088,732.00
Total	570,054,942.00

128. The TRC looks at the costs and benefits that accrue to society, including additional costs paid by customers and non-energy benefits. The PAC reviews costs and benefits from the viewpoint of the program administrator.
129. Independent Electricity System Operator, CDM Plan Submission and Review Criteria Rules, Final Version 3.0 (Toronto: IESO July 2017) at 4.
130. Environmental Commissioner of Ontario, Every Joule Counts, Ontario's Energy Use and Conservation Year in Review (Toronto: ECO, August 2018) at 98.
131. Independent Electricity System Operator, Evaluation of 2017 Save On Energy Residential Province Wide Programs by Cadmus (Toronto: IESO, November 2018) at 143.
132. Independent Electricity System Operator, Evaluation of 2017 Business Programs by Nexant and NMR Group Inc. (Toronto: IESO, November 2018) at 4.
133. Ibid
134. Ibid at 6.
135. Ibid at 7.
136. Ibid.
137. Independent Electricity System Operator, Evaluation of 2017 Save On Energy Residential Province Wide Programs by Cadmus (Toronto: IESO, November 2018) at 140 and 144.
138. Ibid page 144.
139. Independent Electricity System Operator, information provided to the ECO (8 August 2018).
140. Independent Electricity System Operator, Program Year 2017 Evaluation Report: Conservation First Framework Industrial Programs by Econometric (Toronto: IESO, November 2018) at 9.
141. Ibid at 9.
142. Ibid at 76.
143. "2018 Electricity Data", online: Independent Electricity System Operator <www.ieso.ca/en/Corporate-IESO/Media/Year-End-Data>. [Accessed 11 February 2019]
144. Independent Electricity System Operator, information provided to the ECO (15 January 2019). Important to note that not all programs were evaluated for the length of the entire year, i.e., from January 1 2017 to December 31, 2017.
145. "IESO announces Results of Demand Response Auction", online: Independent Electricity System Operator <www.ieso.ca/en/Sector-Participants/IESO-News/2018/12/IESO-Anounces-Results-of-Demand-Response-Auction>. [Accessed 11 February 2019]