

Evaluation of PY2020 CFF Residential Programs

**ADDENDUM TO EVALUATION OF 2018 & 2019 CFF RESIDENTIAL
PROGRAMS REPORT**

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Foreword

This report is an addendum to the *Evaluation Reports of 2018 & 2019 Conservation First Framework (CFF) Residential Programs* and provides an overall summary of the Independent Electricity System Operator funded residential energy efficiency programs energy and demand savings achieved in program year 2020, as well as within the entire CFF (2015 through 2020). This report is intended for all parties who are interested in residential energy efficiency programs in Ontario. All projects that had been pre-approved by the local distribution companies before May 1, 2019 were given until December 31, 2020 to be completed, residential new construction projects timelines were extended until December 31, 2021 due to the impacts of the COVID-19 pandemic.

Acronyms and Abbreviations

| Acronym/Abbreviation | Definition |
|----------------------|---|
| CFF | Conservation First Framework |
| EUL | Effective useful life |
| FNCP | First Nations Conservation program |
| HAP | Home Assistance program |
| IESO | Independent Electricity System Operator |
| LDC | Local distribution company |
| LUEC | Levelized unit electricity cost |
| MURB | Multi-unit residential buildings |
| NTG ratio | Net-to-gross ratio |
| PAC test | Program administrator cost test |
| PY | Program year |
| RNC program | Residential New Construction program |
| TRC test | Total resource cost test |

Executive Summary

As part of the orderly and cost-effective wind down of the Independent Electricity System Operator’s (IESO) Conservation First Framework (CFF), Cadmus evaluated program year (PY) 2020 province-wide and local residential programs using a simplified approach.

This report describes the impact results for PY2020 for three residential programs:

- **Province-wide programs**
 - Residential New Construction (RNC) program
 - Home Assistance program (HAP)
- **Local programs**
 - First Nations Conservation program (FNCP)

In addition, Cadmus summarized the impact and cost-effectiveness results for all residential programs within the CFF period (2015-2020). These results are presented in this report.

PY2020 Summary

For the PY2020 evaluations, Cadmus determined the annual estimated net and gross energy and demand savings at the program level using historical adjustment factors and other parameters. As shown in Table 1, the PY2020 residential programs achieved an estimated total of 1.8 GWh in net 2020 energy savings and 0.392 MW in net 2020 estimated summer peak demand savings.

Table 1. PY2020 Residential Programs Results ^a

| Program | Net Estimated 2020 Energy Savings (GWh) | Net Estimated 2020 Summer Peak Demand Savings (MW) |
|-------------------------------|---|--|
| Province-Wide Programs | 1.8 | 0.387 |
| RNC | 1.3 | 0.325 |
| HAP | 0.4 | 0.062 |
| Local Programs | 0.1 | 0.006 |
| FNCP | 0.1 | 0.006 |
| Total | 1.8 | 0.392 |

^a Net first year savings are excluded in this table because, by definition, net first year savings in 2020 equal net 2020 savings

PY2015 through PY2020 Conservation First Framework Results

As shown in Table 2, the cumulative participation for the CFF was 69,498,679 measures¹ with an estimated total of 2,753.7 GWh in net first year energy savings and 317.858 MW in net first year estimated summer peak demand savings. Net estimated 2020 savings were 2,265.1 GWh and 273.283 MW. Table 3 shows the cumulative TRC, PAC and LUEC results.

Appendix A. PY2015 through PY2020 CFF Impact Results shows the individual savings and participation results by program and by year. *Appendix B. PY2015 through PY2020 CFF CE Results* shows the cost effectiveness results by program and by year.

¹ *Measures* is the generic term for each program's definition of participation. Each program defines *measures* differently. Most of the time, *measures* refer to *projects* but sometimes it refers to *equipment* or *products*. See Table 7 in *Appendix A. PY2015 through PY2020 CFF Impact Results* for the full participation units and results.

Table 2. PY2015 through PY2020 CFF Cumulative Residential Program Impact Results

| Program | Participation | Energy Realization Rate | Demand Realization Rate | NTG Energy Ratio | NTG Demand Ratio | Net Estimated First Year Energy Savings (GWh) | Net Estimated First Year Summer Peak Demand Savings (MW) | Net Estimated 2020 Energy Savings (GWh) | Net Estimated 2020 Summer Peak Demand Savings (MW) |
|---|-------------------|-------------------------|-------------------------|------------------|------------------|---|--|---|--|
| Province-Wide Programs | 67,029,352 | N/A | N/A | 119.1% | 95.3% | 2,492.7 | 264.835 | 2,089.5 | 236.330 |
| Save on Energy Coupon Program | 38,338,262 | 202.9% | 192.5% | 135.6% | 135.4% | 1,057.0 | 70.869 | 954.2 | 63.982 |
| Save on Energy Instant Discount Program | 28,191,071 | 88.1% | 88.1% | 133.3% | 135.0% | 1,069.0 | 78.055 | 768.8 | 56.446 |
| Save on Energy Heating and Cooling Program | 450,150 | 146.9% | 130.8% | 69.0% | 67.7% | 292.1 | 104.067 | 292.1 | 104.067 |
| Save on Energy Home Assistance Program | 44,348 | 95.4% | 2.9% | 100.0% | 100.0% | 51.4 | 7.326 | 51.2 | 7.317 |
| Save on Energy New Construction Program | 5,521 | 46.3% | 166.4% | 62.0% | 66.6% | 23.2 | 4.518 | 23.2 | 4.518 |
| Local Programs | 2,418,674 | N/A | N/A | 86.1% | 99.8% | 240.0 | 50.030 | 154.5 | 33.960 |
| Adaptive Thermostat Local Program | 11,580 | 100.0% | N/A | 100.0% | N/A | 2.7 | 0.000 | 2.7 | 0.000 |
| Conservation on the Coast Home Assistance Program | 171 | 87.5% | 19.1% | 100.0% | 100.0% | 0.8 | 0.014 | 0.8 | 0.014 |
| First Nation Conservation Local Program | 6,518 | 47.6% | 1.6% | 100.0% | 100.0% | 7.7 | 0.610 | 7.7 | 0.610 |
| Instant Savings Program | 25,005 | 35.4% | 5.8% | 170.8% | 170.8% | 3.2 | 0.343 | 3.2 | 0.343 |
| MURB In-Suite Direct Install Lighting Program | 268 | 100.0% | 100.0% | 100.0% | 100.0% | 8.2 | 5.910 | 8.2 | 5.910 |
| Smart Thermostat Rebate | 16,572 | 100.0% | 100.0% | 100.0% | 100.0% | 5.5 | 0.396 | 5.5 | 0.396 |
| Social Benchmarking Local Program | 2,354,357 | N/A | N/A | 83.2% | 93.0% | 198.9 | 40.054 | 113.4 | 23.984 |
| Swimming Pool Efficiency Program | 4,203 | 99.7% | 83.4% | 100.2% | 100.2% | 13.0 | 2.702 | 13.0 | 2.702 |
| Centrally Delivered Programs | 50,653 | N/A | N/A | 89.2% | 89.8% | 21.1 | 2.993 | 21.1 | 2.993 |
| Whole Home Pilot | 50,653 | 58.6% | N/A | 89.2% | 89.8% | 21.1 | 2.993 | 21.1 | 2.993 |
| Total | 69,498,679 | 132.4% | 64.2% | 114.9% | 95.1% | 2,753.7 | 317.858 | 2,265.1 | 273.283 |

Table 3. PY2015 through PY2020 CFF Cumulative Residential Program CE Results

| Program | Cumulative TRC | Cumulative PAC | Cumulative LUEC |
|---|----------------|----------------|-----------------|
| Province-Wide Programs | 5.07 | 4.39 | 0.02 |
| Save on Energy Coupon Program | 20.76 | 4.93 | 0.01 |
| Save on Energy Instant Discount Program | 10.85 | 9.52 | 0.01 |
| Save on Energy Heating and Cooling Program | 1.67 | 2.77 | 0.04 |
| Save on Energy Home Assistance Program | 0.92 | 0.80 | 0.09 |
| Save on Energy New Construction Program | 0.39 | 1.20 | 0.07 |
| Local Programs | 1.75 | 1.59 | 0.05 |
| Adaptive Thermostat Local Program | 0.70 | 1.24 | 0.04 |
| Conservation on the Coast Home Assistance Program | 0.21 | 0.18 | 0.28 |
| First Nation Conservation Local Program | 0.67 | 0.58 | 0.11 |
| Instant Savings Program | 2.05 | 2.16 | 0.03 |
| MURB In-Suite Direct Install Lighting Program | 8.71 | 7.43 | 0.03 |
| Smart Thermostat Rebate | 1.61 | 2.50 | 0.02 |
| Social Benchmarking Local Program | 1.76 | 1.53 | 0.05 |
| Swimming Pool Efficiency Program | 0.87 | 0.86 | 0.11 |
| Centrally Delivered Programs | 0.37 | 0.64 | 0.11 |
| Whole Home Pilot | 0.37 | 0.64 | 0.11 |
| Total | 4.31 | 3.85 | 0.02 |

Impact Evaluation Approach

This section describes Cadmus’ overall approach to calculate program-level energy savings, demand savings, incremental costs and effective useful life (EUL). In PY2020, Cadmus used program-level realization rates and NTG ratios based on past program performance—shown in Table 4—to continue the simplified evaluation approach as part of the orderly and cost-effective CFF wind down.

The IESO provided Cadmus with raw PY2020 participation data for each program, which we reviewed for erroneous or missing values and removed duplicate data. Cadmus then reviewed projects across all programs for energy savings and summer peak demand savings using the historical samples of estimated projects from previous evaluation years.

For most programs, Cadmus estimated program-level gross savings by multiplying aggregated measure-level reported savings by program-level historical realization rates (using up to three years of historical results). Consistent with the PY2018 evaluation of HAP and the PY2019 evaluation of FNCP, Cadmus used the historical program-level energy-to-demand ratios since the demand savings were often reported as “connected demand” instead of “peak demand” (and was therefore multiple orders of magnitude too large). Using a realization rate in these cases would also produce estimated demand savings that were orders of magnitude too large. The program-level energy-to-demand ratios are not dependent on reported demand savings, and thus are aligned with past program performance.

To estimate net savings, Cadmus multiplied the program-level gross savings by historical NTG ratios, averaging up to three years of results, consistent with PY2018 and PY2019 program design and measures.

Table 4. Assumptions for Program Realization Rates

| Program | Energy Realization Rate | Demand Realization Rate | Energy Net-to-Gross | Demand Net-to-Gross | Assumptions |
|---------|-------------------------|-------------------------|---------------------|---------------------|---|
| RNC | 21.00% | 114.00% | 80.80% | 78.70% | Applied weighted average of PY2016 and PY2017 results due to baseline update between PY2015 and PY2016. |
| HAP | 65.20% | N/A ^a | 100.00% | 100.00% | Applied PY2015 through PY2017 weighted average of energy savings realization rates, as no major program design changes have occurred since PY2015. For demand savings, multiplied the PY2015 through PY2017 average ratio of demand-to-energy savings by the PY2018 realized energy savings. Assumed NTG of 100% for low-income programs. |
| FNCP | 47.60% | N/A ^a | 100.00% | 100.00% | Applied PY2016 and PY2017 weighted average. Assumed NTG of 100% for indigenous programs. |

^a Indicates that Cadmus used the historical program-level energy-to-demand ratios instead of demand realization rates.

Consistent with the approach used for calculating realization rates and NTG ratios in PY2018, Cadmus estimated the incremental costs and EUL at the program level. For HAP and FNCP, where incentives equal incremental costs, Cadmus applied the weighted average incremental costs per project from PY2017. For the RNC program, Cadmus calculated PY2019 incremental costs by weighting the PY2017 incremental costs by measure counts.

Cadmus calculated lifetime savings using program-level EUL and savings persistence factors. The savings persistence factors represent the percentage of first year savings that continue to accrue for each year of the program's EUL (estimated by dividing the total annual savings in each year of the program's EUL by the program's first year savings).

Residential New Construction Program

Launched in PY2011, the RNC program encouraged homebuilders to include energy-efficient design and technologies in new and substantially renovated homes. Residential homebuilders received incentives to participate in three program tracks—prescriptive, performance and custom:

- Through the prescriptive track, the IESO offered incentives for installing individual measures including dimmer switches, ENERGY STAR® lighting, motion sensors and central air conditioners.
- Through the performance track, the IESO provided incentives for homes receiving an ENERGY STAR certification, an EnerGuide rating of 83 or 84 or an EnerGuide rating of 85 or more from a Natural Resources Canada auditor.
- Through the custom track, the IESO provided incentives based on savings from improvements exceeding the Ontario Building Code.

Table 5 shows the participation, gross and net program savings, realization rates and NTG ratio for PY2019 and PY2020.

Table 5. PY2019 and PY2020 Residential New Construction Program Performance

| Item | Units | PY2019 | PY2020 |
|---|---------|----------|----------|
| Participation | Homes | 80 | 47 |
| Gross Estimated Savings | MWh | 1,450.70 | 1,662.00 |
| Gross Estimated Savings | MW | 0.302 | 0.412 |
| Gross Realization Rate | % (MWh) | 21.00% | 21.00% |
| Gross Realization Rate | % (MW) | 114.00% | 114.00% |
| Net Estimated Annual Savings (First Year) | MWh | 1,172.20 | 1,342.90 |
| Net Estimated Annual Savings (First Year) | MW | 0.237 | 0.325 |
| Net Estimated Annual Savings (PY2020) | MWh | 1,172.20 | 1,342.90 |
| Net Estimated Annual Savings (PY2020) | MW | 0.237 | 0.325 |
| Net-to-Gross Ratio (MWh) | % | 80.80% | 80.80% |

Home Assistance Program

Launched in PY2011 and managed by the IESO and local distribution companies (LDCs), HAP helped income-qualified homeowners and tenants in nonprofit housing and private rentals improve the energy efficiency of their home and manage their energy use more effectively at no cost to the resident or owner. Program representatives (delivery agents or LDC staff) first conducted an energy audit to identify appropriate program measures. With participant or property owner consent, the representative installed these measures, either through the initial audit visit or during a follow-up visit. Measures included showerheads, aerators, LEDs, power bars, window air conditioners, dehumidifiers, clothes drying racks, draft proofing and attic insulation. During the audit, participants also received education about electricity conservation, time-of-use rates and the new energy efficiency equipment they received.

Participants in single-family homes that are heated by electricity may have received a more extensive weatherization audit to determine eligibility for additional air sealing and insulation upgrades. To receive weatherization or domestic hot water measures (or both), the residence must have been heated by or produced hot water using electricity.

Table 6 shows the participation, gross and net program savings, realization rates and NTG ratio for PY2019 and PY2020. Note that for demand, Cadmus used the program-level energy-to-demand ratio (0.0140%) because the reported demand savings were orders of magnitude too high relative to what was expected in previous years. The demand realization reported represents the estimated demand savings divided by the reported demand savings (without the realization rate applied).

Table 6. PY2019 and PY2020 Home Assistance Program Performance

| Item | Units | PY2019 | PY2020 |
|---|----------|----------|---------|
| Participation | Projects | 8,379 | 334 |
| Gross Estimated Savings | MWh | 8,139.90 | 442.90 |
| Gross Estimated Savings | MW | 1.747 | 0.062 |
| Gross Realization Rate | % (MWh) | 65.20% | 65.20% |
| Gross Realization Rate | % (MW) | 2.20% | 136.42% |
| Net Estimated Annual Savings (First Year) | MWh | 8,139.90 | 442.90 |
| Net Estimated Annual Savings (First Year) | MW | 1.747 | 0.062 |
| Net Estimated Annual Savings (PY2020) | MWh | 8,139.90 | 442.90 |
| Net Estimated Annual Savings (PY2020) | MW | 1.747 | 0.062 |
| Net-to-Gross Ratio (MWh) | % | 100.00% | 100.00% |

First Nations Conservation Program

From PY2011 to PY2014, the IESO offered the Aboriginal Conservation program to help on-reserve First Nation customers improve the energy efficiency of their homes. Starting in PY2015, the IESO transferred delivery of the Aboriginal Conservation program to the LDCs.

Consequently, Hydro One created the FNCP to directly serve its First Nation communities. The program, managed by Hydro One, helped homeowners and tenants in band-owned and private housing to improve the energy efficiency of their homes and manage their energy use more effectively at no cost to the resident or owner. A program representative directly installed eligible efficiency measures, as determined through an in-home energy audit, and provided conservation education to participants. The program measures included LEDs, power bars, blocker heater timers, aerators, dehumidifiers, refrigerator or freezer replacements, programmable thermostats and attic, basement and hot water tank insulation. In addition, the LDC could make repairs to the residence, install eligible measures and make health and safety upgrades where necessary.

Table 7 shows the participation, gross and net program savings, realization rates and NTG ratio for PY2019 and PY2020. Note that for demand, Cadmus used the program-level energy-to-demand ratio (0.0094%) because the reported demand savings were orders of magnitude too high relative to what was expected in previous years. The demand realization reported represents the estimated demand savings divided by the reported demand savings (without the realization rate applied).

Table 7. PY2019 and PY2020 First Nations Conservation Program Performance

| Item | Units | PY2019 | PY2020 |
|---|----------|----------|---------|
| Participation | Projects | 2,442 | 169 |
| Gross Estimated Savings | MWh | 2,070.60 | 60.87 |
| Gross Estimated Savings | MW | 0.410 | 0.006 |
| Gross Realization Rate | % (MWh) | 47.60% | 47.60% |
| Gross Realization Rate | % (MW) | 1.30% | 26.55% |
| Net Estimated Annual Savings (First Year) | MWh | 2,070.60 | 60.87 |
| Net Estimated Annual Savings (First Year) | MW | 0.410 | 0.006 |
| Net Estimated Annual Savings (PY2020) | MWh | 2,070.60 | 60.87 |
| Net Estimated Annual Savings (PY2020) | MW | 0.410 | 0.006 |
| Net-to-Gross Ratio (MWh) | % | 100.00% | 100.00% |

Appendix A. PY2015 through PY2020 CFF Impact Results

Appendix A summarizes participation, net first year savings, net 2020 savings, realization rates, and NTG ratios by year and in the entire CFF framework.

Overall, Province-Wide programs made up the vast majority of total net 2020 energy and demand savings (92% and 87% respectively) and participation (96%). The Save on Energy Coupon Program and, its successor, the Save on Energy Instant Discount Program, comprised 76% of the total net 2020 GWh savings in the entire CFF period—even though, combined, they only ran from PY2015 through PY2018. The reason for this, is that these programs were driven by lighting measures—which were extremely savings intensive on a per-unit basis before 2020. With Ontario regulations² requiring general purpose lamps manufactured after January 1, 2020 to be 45 lumens/watt or greater (effectively the equivalent of a compact fluorescent bulb) it is unlikely that lighting savings in future frameworks will ever be as high as they were in the CFF.

The Save on Energy Heating and Cooling program made up 13% of total net 2020 GWh savings but 38% of total MW savings. This was expected as peak demand is calculated around central air conditioners and heat pumps running in the summer. The income-qualified program—Save on Energy Home Assistance Program—and the new construction program—Save on Energy New Construction Program—comprised 3% of total net 2020 GWh and 4% of total net 2020 MW.

² Ontario Energy and Water Efficiency Regulations. Schedule 5, Section 1.
<https://www.ontario.ca/laws/regulation/180509#BK15>.

Table 8. PY2015 through PY2020 CFF Cumulative Impact Participation Results

| Program | Participation Units | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|---------------------|------------------|-------------------|-------------------|-------------------|----------------|------------|-------------------|
| Province-Wide Programs | | 2,375,142 | 19,144,267 | 29,310,579 | 16,166,254 | 32,730 | 381 | 67,029,352 |
| Save on Energy Coupon Program | Products | 2,226,184 | 18,999,679 | 17,112,400 | - | - | - | 38,338,262 |
| Save on Energy Instant Discount Program | Products | - | - | 12,087,827 | 16,103,244 | - | - | 28,191,071 |
| Save on Energy Heating and Cooling Program | Equipment | 127,250 | 137,951 | 102,931 | 57,885 | 24,133 | - | 450,150 |
| Save on Energy Home Assistance Program | Homes | 17,550 | 6,414 | 6,988 | 4,661 | 8,401 | 334 | 44,348 |
| Save on Energy New Construction Program | Homes | 4,158 | 223 | 433 | 464 | 196 | 47 | 5,521 |
| Local Programs | | - | 208,997 | 1,076,569 | 577,791 | 555,148 | 169 | 2,418,674 |
| Adaptive Thermostat Local Program | Products | - | 1,118 | 5,485 | 4,326 | 651 | - | 11,580 |
| Conservation on the Coast Home Assistance Program | Homes | - | 112 | 30 | 29 | - | - | 171 |
| First Nation Conservation Local Program | Homes | - | - | 2,142 | 1,743 | 2,464 | 169 | 6,518 |
| Instant Savings Program | Homes | - | - | 13,337 | 11,357 | 311 | - | 25,005 |
| MURB In-Suite Direct Install Lighting Program | Projects | - | - | - | 66 | 202 | - | 268 |
| Smart Thermostat Rebate | Measures | - | - | 3,141 | 13,431 | - | - | 16,572 |
| Social Benchmarking Local Program | Participants | - | 207,767 | 1,050,385 | 544,769 | 551,436 | - | 2,354,357 |
| Swimming Pool Efficiency Program | Homes | - | - | 2,049 | 2,070 | 84 | - | 4,203 |
| Centrally Delivered Programs | | - | - | 16,049 | 34,604 | - | - | 50,653 |
| Whole Home Pilot | Homes | - | - | 16,049 | 34,604 | - | - | 50,653 |
| Total | | 2,375,142 | 19,353,264 | 30,403,197 | 16,778,649 | 587,878 | 550 | 69,498,679 |

Table 9. PY2015 through PY2020 CFF Net Verified First Year Energy Savings (GWh) by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|--------------|--------------|----------------|--------------|-------------|------------|----------------|
| Province-Wide Programs | 144.8 | 566.4 | 1,047.8 | 706.6 | 25.3 | 1.8 | 2,492.7 |
| Save on Energy Coupon Program | 56.6 | 477.8 | 522.5 | - | - | - | 1,057.0 |
| Save on Energy Instant Discount Program | - | - | 442.8 | 626.2 | - | - | 1,069.0 |
| Save on Energy Heating and Cooling Program | 58.8 | 77.1 | 71.4 | 69.9 | 14.9 | - | 292.1 |
| Save on Energy Home Assistance Program | 18.1 | 9.2 | 8.3 | 7.1 | 8.2 | 0.4 | 51.4 |
| Save on Energy New Construction Program | 11.3 | 2.3 | 2.8 | 3.4 | 2.2 | 1.3 | 23.2 |
| Local Programs | - | 9.7 | 127.3 | 78.3 | 24.6 | 0.1 | 240.0 |
| Adaptive Thermostat Local Program | - | 0.2 | 1.4 | 1.0 | 0.2 | - | 2.7 |
| Conservation on the Coast Home Assistance Program | - | 0.4 | 0.2 | 0.1 | - | - | 0.8 |
| First Nation Conservation Local Program | - | - | 3.3 | 2.2 | 2.1 | 0.1 | 7.7 |
| Instant Savings Program | - | - | 1.7 | 1.6 | 0.0 | - | 3.2 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 1.5 | 6.7 | - | 8.2 |
| Smart Thermostat Rebate | - | - | 1.0 | 4.4 | - | - | 5.5 |
| Social Benchmarking Local Program | - | 9.0 | 113.4 | 61.0 | 15.4 | - | 198.9 |
| Swimming Pool Efficiency Program | - | - | 6.3 | 6.5 | 0.2 | - | 13.0 |
| Centrally Delivered Programs | - | - | 10.1 | 11.0 | - | - | 21.1 |
| Whole Home Pilot | - | - | 10.1 | 11.0 | - | - | 21.1 |
| Total | 144.8 | 576.0 | 1,185.2 | 795.9 | 49.9 | 1.8 | 2,753.7 |

Table 10. PY2015 through PY2020 CFF Net Verified First Year Demand Savings (MW) by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|---------------|---------------|----------------|---------------|---------------|--------------|----------------|
| Province-Wide Programs | 38.727 | 55.102 | 88.862 | 74.559 | 7.198 | 0.387 | 264.835 |
| Save on Energy Coupon Program | 3.661 | 31.003 | 36.205 | - | - | - | 70.869 |
| Save on Energy Instant Discount Program | - | - | 30.369 | 47.686 | - | - | 78.055 |
| Save on Energy Heating and Cooling Program | 30.709 | 22.662 | 20.308 | 25.160 | 5.228 | - | 104.067 |
| Save on Energy Home Assistance Program | 2.957 | 0.958 | 1.208 | 0.997 | 1.143 | 0.062 | 7.326 |
| Save on Energy New Construction Program | 1.399 | 0.479 | 0.773 | 0.716 | 0.827 | 0.325 | 4.518 |
| Local Programs | - | 3.620 | 25.801 | 15.544 | 5.058 | 0.006 | 50.030 |
| Adaptive Thermostat Local Program | - | - | - | - | - | - | - |
| Conservation on the Coast Home Assistance Program | - | 0.010 | 0.002 | 0.002 | - | - | 0.014 |
| First Nation Conservation Local Program | - | - | 0.277 | 0.131 | 0.196 | 0.006 | 0.610 |
| Instant Savings Program | - | - | 0.259 | 0.083 | 0.001 | - | 0.343 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 1.110 | 4.800 | - | 5.910 |
| Smart Thermostat Rebate | - | - | 0.075 | 0.321 | - | - | 0.396 |
| Social Benchmarking Local Program | - | 3.610 | 23.984 | 12.459 | - | - | 40.054 |
| Swimming Pool Efficiency Program | - | - | 1.204 | 1.437 | 0.060 | - | 2.702 |
| Centrally Delivered Programs | - | - | 1.431 | 1.562 | - | - | 2.993 |
| Whole Home Pilot | - | - | 1.431 | 1.562 | - | - | 2.993 |
| Total | 38.727 | 58.723 | 116.094 | 91.665 | 12.256 | 0.392 | 317.858 |

Table 11. PY2015 through PY2020 CFF Net Verified 2020 Energy Savings (GWh) by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|--------------|--------------|--------------|--------------|-------------|------------|----------------|
| Province-Wide Programs | 144.1 | 566.3 | 823.5 | 528.5 | 25.3 | 1.8 | 2,089.5 |
| Save on Energy Coupon Program | 56.1 | 477.8 | 420.3 | - | - | - | 954.2 |
| Save on Energy Instant Discount Program | - | - | 320.7 | 448.1 | - | - | 768.8 |
| Save on Energy Heating and Cooling Program | 58.8 | 77.1 | 71.4 | 69.9 | 14.9 | - | 292.1 |
| Save on Energy Home Assistance Program | 17.9 | 9.2 | 8.3 | 7.1 | 8.2 | 0.4 | 51.2 |
| Save on Energy New Construction Program | 11.3 | 2.3 | 2.8 | 3.4 | 2.2 | 1.3 | 23.2 |
| Local Programs | - | 0.6 | 127.3 | 17.3 | 9.2 | 0.1 | 154.5 |
| Adaptive Thermostat Local Program | - | 0.2 | 1.4 | 1.0 | 0.2 | - | 2.7 |
| Conservation on the Coast Home Assistance Program | - | 0.4 | 0.2 | 0.1 | - | - | 0.8 |
| First Nation Conservation Local Program | - | - | 3.3 | 2.2 | 2.1 | 0.1 | 7.7 |
| Instant Savings Program | - | - | 1.7 | 1.6 | 0.0 | - | 3.2 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 1.5 | 6.7 | - | 8.2 |
| Smart Thermostat Rebate | - | - | 1.0 | 4.4 | - | - | 5.5 |
| Social Benchmarking Local Program | - | - | 113.4 | - | - | - | 113.4 |
| Swimming Pool Efficiency Program | - | - | 6.3 | 6.5 | 0.2 | - | 13.0 |
| Centrally Delivered Programs | - | - | 10.1 | 11.0 | - | - | 21.1 |
| Whole Home Pilot | - | - | 10.1 | 11.0 | - | - | 21.1 |
| Total | 144.1 | 567.0 | 960.9 | 556.9 | 34.5 | 1.8 | 2,265.1 |

Table 12. PY2015 through PY2020 CFF Net Verified 2020 Demand Savings (MW) by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|---------------|---------------|----------------|---------------|---------------|--------------|----------------|
| Province-Wide Programs | 38.686 | 55.100 | 73.821 | 61.138 | 7.198 | 0.387 | 236.330 |
| Save on Energy Coupon Program | 3.627 | 31.003 | 29.352 | - | - | - | 63.982 |
| Save on Energy Instant Discount Program | - | - | 22.180 | 34.266 | - | - | 56.446 |
| Save on Energy Heating and Cooling Program | 30.709 | 22.662 | 20.308 | 25.160 | 5.228 | - | 104.067 |
| Save on Energy Home Assistance Program | 2.950 | 0.956 | 1.208 | 0.997 | 1.143 | 0.062 | 7.317 |
| Save on Energy New Construction Program | 1.399 | 0.479 | 0.773 | 0.716 | 0.827 | 0.325 | 4.518 |
| Local Programs | - | 0.010 | 25.801 | 3.085 | 5.058 | 0.006 | 33.960 |
| Adaptive Thermostat Local Program | - | - | - | - | - | - | - |
| Conservation on the Coast Home Assistance Program | - | 0.010 | 0.002 | 0.002 | - | - | 0.014 |
| First Nation Conservation Local Program | - | - | 0.277 | 0.131 | 0.196 | 0.006 | 0.610 |
| Instant Savings Program | - | - | 0.259 | 0.083 | 0.001 | - | 0.343 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 1.110 | 4.800 | - | 5.910 |
| Smart Thermostat Rebate | - | - | 0.075 | 0.321 | - | - | 0.396 |
| Social Benchmarking Local Program | - | - | 23.984 | - | - | - | 23.984 |
| Swimming Pool Efficiency Program | - | - | 1.204 | 1.437 | 0.060 | - | 2.702 |
| Centrally Delivered Programs | - | - | 1.431 | 1.562 | - | - | 2.993 |
| Whole Home Pilot | - | - | 1.431 | 1.562 | - | - | 2.993 |
| Total | 38.686 | 55.111 | 101.053 | 65.785 | 12.256 | 0.392 | 273.283 |

Table 13. PY2015 through PY2020 CFF Gross Energy Realization Rate by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|---------------|---------------|---------------|--------------|---------------|--------------|---------------|
| Province-Wide Programs | | | | | | | |
| Save on Energy Coupon Program | 101.0% | 167.8% | 275.1% | N/A | N/A | N/A | 202.9% |
| Save on Energy Instant Discount Program | N/A | N/A | 88.1% | 88.1% | N/A | N/A | 88.1% |
| Save on Energy Heating and Cooling Program | 2732.8% | 112.0% | 107.3% | 107.3% | 107.3% | N/A | 146.9% |
| Save on Energy Home Assistance Program | 874.7% | 74.6% | 54.4% | 65.2% | 65.2% | 65.2% | 95.4% |
| Save on Energy New Construction Program | 210.6% | 19.4% | 22.8% | 21.0% | 21.0% | 21.0% | 46.3% |
| Local Programs | | | | | | | |
| Adaptive Thermostat Local Program | N/A | 100.0% | 100.0% | 100.0% | 100.0% | N/A | 100.0% |
| Conservation on the Coast Home Assistance Program | N/A | 93.4% | 78.8% | 87.5% | N/A | N/A | 87.5% |
| First Nation Conservation Local Program | N/A | N/A | 47.6% | 47.6% | 47.6% | 47.6% | 47.6% |
| Instant Savings Program | N/A | N/A | 35.4% | 35.4% | 35.4% | N/A | 35.4% |
| MURB In-Suite Direct Install Lighting Program | N/A | N/A | N/A | 100.0% | 100.0% | N/A | 100.0% |
| Smart Thermostat Rebate | N/A | N/A | 100.0% | 100.0% | N/A | N/A | 100.0% |
| Social Benchmarking Local Program | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Swimming Pool Efficiency Program | N/A | N/A | 99.7% | 99.7% | 99.7% | N/A | 99.7% |
| Centrally Delivered Programs | | | | | | | |
| Whole Home Pilot | N/A | N/A | 70.0% | 51.0% | N/A | N/A | 58.6% |
| Total | 368.8% | 144.6% | 148.6% | 96.9% | 104.7% | 24.8% | 132.4% |

Table 14. PY2015 through PY2020 CFF Gross Demand Realization Rate by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|----------------|---------------|---------------|--------------|--------------|---------------|---------------|
| Province-Wide Programs | | | | | | | |
| Save on Energy Coupon Program | 58.2% | 165.0% | 281.5% | N/A | N/A | N/A | 192.5% |
| Save on Energy Instant Discount Program | N/A | N/A | 88.1% | 88.1% | N/A | N/A | 88.1% |
| Save on Energy Heating and Cooling Program | 4778.5% | 107.7% | 71.9% | 71.9% | 71.9% | N/A | 130.8% |
| Save on Energy Home Assistance Program | 568.3% | 16.5% | 15.3% | 0.6% | 1.5% | 136.4% | 2.9% |
| Save on Energy New Construction Program | 406.2% | 85.1% | 167.6% | 114.0% | 114.0% | 114.0% | 166.4% |
| Local Programs | | | | | | | |
| Adaptive Thermostat Local Program | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Conservation on the Coast Home Assistance Program | N/A | 20.6% | 14.1% | 19.1% | N/A | N/A | 19.1% |
| First Nation Conservation Local Program | N/A | N/A | 8.6% | 8.6% | 0.6% | 26.5% | 1.6% |
| Instant Savings Program | N/A | N/A | 5.8% | 5.8% | 5.8% | N/A | 5.8% |
| MURB In-Suite Direct Install Lighting Program | N/A | N/A | N/A | 100.0% | 100.0% | N/A | 100.0% |
| Smart Thermostat Rebate | N/A | N/A | 100.0% | 100.0% | N/A | N/A | 100.0% |
| Social Benchmarking Local Program | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Swimming Pool Efficiency Program | N/A | N/A | 83.4% | 83.4% | 83.4% | N/A | 83.4% |
| Centrally Delivered Programs | | | | | | | |
| Whole Home Pilot | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Total | 1070.7% | 120.1% | 123.9% | 34.2% | 10.9% | 112.0% | 64.2% |

Table 15. PY2015 through PY2020 CFF NTG Energy Ratio by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|--------------|---------------|---------------|---------------|--------------|--------------|---------------|
| Province-Wide Programs | | | | | | | |
| Save on Energy Coupon Program | 163.1% | 140.4% | 129.3% | N/A | N/A | N/A | 135.6% |
| Save on Energy Instant Discount Program | N/A | N/A | 133.3% | 133.3% | N/A | N/A | 133.3% |
| Save on Energy Heating and Cooling Program | 51.5% | 70.5% | 78.1% | 78.1% | 78.1% | N/A | 69.0% |
| Save on Energy Home Assistance Program | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Save on Energy New Construction Program | 49.6% | 80.6% | 81.1% | 80.8% | 80.8% | 80.8% | 62.0% |
| Local Programs | | | | | | | |
| Adaptive Thermostat Local Program | N/A | 100.0% | 100.0% | 100.0% | 100.0% | N/A | 100.0% |
| Conservation on the Coast Home Assistance Program | N/A | 100.0% | 100.0% | 100.0% | N/A | N/A | 100.0% |
| First Nation Conservation Local Program | N/A | N/A | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Instant Savings Program | N/A | N/A | 170.8% | 170.8% | 170.8% | N/A | 170.8% |
| MURB In-Suite Direct Install Lighting Program | N/A | N/A | N/A | 100.0% | 100.0% | N/A | 100.0% |
| Smart Thermostat Rebate | N/A | N/A | 100.0% | 100.0% | N/A | N/A | 100.0% |
| Social Benchmarking Local Program | N/A | 76.9% | 82.4% | 85.4% | 85.4% | N/A | 83.2% |
| Swimming Pool Efficiency Program | N/A | N/A | 100.2% | 100.2% | 100.2% | N/A | 100.2% |
| Centrally Delivered Programs | | | | | | | |
| Whole Home Pilot | N/A | N/A | 89.5% | 89.0% | N/A | N/A | 89.2% |
| Total | 76.4% | 121.5% | 118.3% | 118.6% | 87.2% | 85.3% | 114.9% |

Table 16. PY2015 through PY2020 CFF NTG Demand Ratio by Year

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|--------------|--------------|---------------|---------------|--------------|--------------|---------------|
| Province-Wide Programs | | | | | | | |
| Save on Energy Coupon Program | 163.1% | 140.4% | 129.3% | N/A | N/A | N/A | 135.4% |
| Save on Energy Instant Discount Program | N/A | N/A | 135.0% | 135.0% | N/A | N/A | 135.0% |
| Save on Energy Heating and Cooling Program | 51.5% | 71.8% | 81.1% | 81.1% | 81.1% | N/A | 67.7% |
| Save on Energy Home Assistance Program | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Save on Energy New Construction Program | 49.5% | 77.8% | 79.5% | 78.7% | 78.7% | 78.7% | 66.6% |
| Local Programs | | | | | | | |
| Adaptive Thermostat Local Program | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Conservation on the Coast Home Assistance Program | N/A | 100.0% | 100.0% | 100.0% | N/A | N/A | 100.0% |
| First Nation Conservation Local Program | N/A | N/A | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Instant Savings Program | N/A | N/A | 170.8% | 170.8% | 170.8% | N/A | 170.8% |
| MURB In-Suite Direct Install Lighting Program | N/A | N/A | N/A | 100.0% | 100.0% | N/A | 100.0% |
| Smart Thermostat Rebate | N/A | N/A | 100.0% | 100.0% | N/A | N/A | 100.0% |
| Social Benchmarking Local Program | N/A | 92.0% | 93.0% | 93.2% | N/A | N/A | 93.0% |
| Swimming Pool Efficiency Program | N/A | N/A | 100.2% | 100.2% | 100.2% | N/A | 100.2% |
| Centrally Delivered Programs | | | | | | | |
| Whole Home Pilot | N/A | N/A | 89.5% | 90.0% | N/A | N/A | 89.8% |
| Total | 57.2% | 99.3% | 108.7% | 106.1% | 89.5% | 81.7% | 95.1% |

Appendix B. PY2015 through PY2020 CFF CE Results

Appendix B summarizes the cost effectiveness results (TRC, PAC, and LUEC) for the entire CFF framework.

The degree to which the residential portfolio was cost effective or not was always driven by the Save on Energy Coupon Program and the Save on Energy Instant Discount program. Both programs made up the vast majority of savings, and, had the highest TRCs and PACs.

Table 17. PY2015 through PY2020 CFF TRC Results

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Province-Wide Programs | 1.09 | 4.90 | 6.61 | 5.45 | 0.95 | 0.24 | 5.07 |
| Save on Energy Coupon Program | - | 18.72 | 23.27 | - | - | - | 20.76 |
| Save on Energy Instant Discount Program | - | - | 14.95 | 9.10 | - | - | 10.85 |
| Save on Energy Heating and Cooling Program | - | 1.36 | 1.30 | 3.08 | 1.70 | - | 1.67 |
| Save on Energy Home Assistance Program | 1.46 | 1.06 | 0.87 | 1.02 | 0.80 | 0.67 | 0.92 |
| Save on Energy New Construction Program | 1.09 | 0.25 | 0.33 | 0.28 | 0.26 | 0.20 | 0.39 |
| Local Programs | - | 0.56 | 2.07 | 1.03 | 2.26 | 0.28 | 1.75 |
| Adaptive Thermostat Local Program | - | 0.55 | 0.81 | 0.64 | 0.52 | - | 0.70 |
| Conservation on the Coast Home Assistance Program | - | - | 0.32 | 0.13 | - | - | 0.21 |
| First Nation Conservation Local Program | - | - | 0.71 | 0.65 | 0.67 | 0.28 | 0.67 |
| Instant Savings Program | - | 1.00 | 2.98 | 1.97 | 0.09 | - | 2.05 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 6.20 | 9.58 | - | 8.71 |
| Smart Thermostat Rebate | - | - | 1.78 | 1.58 | - | - | 1.61 |
| Social Benchmarking Local Program | - | - | 2.54 | 0.71 | 0.24 | - | 1.76 |
| Swimming Pool Efficiency Program | - | - | 2.99 | 3.24 | 0.44 | - | 0.87 |
| Centrally Delivered Programs | - | - | 0.53 | 0.31 | - | - | 0.37 |
| Whole Home Pilot | - | - | 0.53 | 0.31 | - | - | 0.37 |
| Total | 1.09 | 4.90 | 5.53 | 3.85 | 1.18 | 0.24 | 4.31 |

Table 18. PY2015 through PY2020 CFF PAC Results

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Province-Wide Programs | 1.87 | 3.30 | 4.93 | 6.31 | 1.66 | 0.93 | 4.39 |
| Save on Energy Coupon Program | - | 4.61 | 5.30 | - | - | - | 4.93 |
| Save on Energy Instant Discount Program | - | - | 10.46 | 9.01 | - | - | 9.52 |
| Save on Energy Heating and Cooling Program | - | 2.05 | 2.56 | 4.47 | 3.00 | - | 2.77 |
| Save on Energy Home Assistance Program | 1.27 | 0.92 | 0.76 | 0.89 | 0.70 | 0.58 | 0.80 |
| Save on Energy New Construction Program | 1.87 | 0.66 | 0.95 | 0.90 | 1.40 | 1.11 | 1.20 |
| Local Programs | - | 0.66 | 1.86 | 0.97 | 1.97 | 0.24 | 1.59 |
| Adaptive Thermostat Local Program | - | 0.66 | 1.79 | 1.08 | 0.77 | - | 1.24 |
| Conservation on the Coast Home Assistance Program | - | - | 0.28 | 0.11 | - | - | 0.18 |
| First Nation Conservation Local Program | - | - | 0.62 | 0.57 | 0.58 | 0.24 | 0.58 |
| Instant Savings Program | - | - | 3.50 | 2.02 | 0.08 | - | 2.16 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 5.39 | 8.12 | - | 7.43 |
| Smart Thermostat Rebate | - | - | 3.10 | 2.40 | - | - | 2.50 |
| Social Benchmarking Local Program | - | - | 2.21 | 0.62 | 0.21 | - | 1.53 |
| Swimming Pool Efficiency Program | - | - | 4.78 | 5.24 | 0.40 | - | 0.86 |
| Centrally Delivered Programs | - | - | 0.93 | 0.53 | - | - | 0.64 |
| Whole Home Pilot | - | - | 0.93 | 0.53 | - | - | 0.64 |
| Total | 1.87 | 3.29 | 4.31 | 4.52 | 1.75 | 0.87 | 3.85 |

Table 19. PY2015 through PY2020 CFF LUEC Results (\$/kWh)

| Program | PY2015 | PY2016 | PY2017 | PY2018 | PY2019 | PY2020 | Total |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Province-Wide Programs | 0.04 | 0.02 | 0.01 | 0.01 | 0.07 | 0.10 | 0.02 |
| Save on Energy Coupon Program | - | 0.01 | 0.01 | - | - | - | 0.01 |
| Save on Energy Instant Discount Program | - | - | 0.01 | 0.01 | - | - | 0.01 |
| Save on Energy Heating and Cooling Program | - | 0.05 | 0.04 | 0.03 | 0.04 | - | 0.04 |
| Save on Energy Home Assistance Program | 0.05 | 0.07 | 0.09 | 0.08 | 0.11 | 0.14 | 0.09 |
| Save on Energy New Construction Program | 0.04 | 0.13 | 0.11 | 0.10 | 0.09 | 0.09 | 0.07 |
| Local Programs | - | 0.06 | 0.04 | 0.08 | 0.07 | 0.30 | 0.05 |
| Adaptive Thermostat Local Program | - | 0.06 | 0.02 | 0.04 | 0.06 | - | 0.04 |
| Conservation on the Coast Home Assistance Program | - | - | 0.18 | 0.47 | - | - | 0.28 |
| First Nation Conservation Local Program | - | - | 0.10 | 0.11 | 0.12 | 0.30 | 0.11 |
| Instant Savings Program | - | - | 0.02 | 0.03 | 0.71 | - | 0.03 |
| MURB In-Suite Direct Install Lighting Program | - | - | - | 0.04 | 0.02 | - | 0.03 |
| Smart Thermostat Rebate | - | - | 0.02 | 0.03 | - | - | 0.02 |
| Social Benchmarking Local Program | - | - | 0.03 | 0.11 | 0.19 | - | 0.05 |
| Swimming Pool Efficiency Program | - | - | 0.02 | 0.02 | 0.25 | - | 0.11 |
| Centrally Delivered Programs | - | - | 0.07 | 0.14 | - | - | 0.11 |
| Whole Home Pilot | - | - | 0.07 | 0.14 | - | - | 0.11 |
| Total | 0.04 | 0.02 | 0.02 | 0.02 | 0.07 | 0.11 | 0.02 |