

2019-2021 DRAFT PLAN CONSULTANT REVIEW



► **May 16, 2018**

OUTLINE



- 1. High level observations and plan portfolio summary**
- 2. Electric program savings and costs**
- 3. Gas program savings and costs**
- 4. C&I plan summary and key considerations**
- 5. Residential and low income plan summary and key considerations**
- 6. Cross cutting key issues to address**
- 7. Conclusions and next steps**

HIGH LEVEL OBSERVATIONS

- ▶ **Plan is well written but lacks the detail needed to respond to many EEAC recommendations**
- ▶ **Benefits are \$1.6 billion lower than current plan**
- ▶ **Savings are lower than current plan while costs to achieve are higher than expected**
- ▶ **No large apparent change in program measure mix or delivery**
- ▶ **Active demand management included but limited energy storage**
- ▶ **Wide variation in planning assumptions among PAs indicates additional coordination across PAs would be useful**
- ▶ **Need to retain kWh and therm metrics in addition to MMBtu in order to track primary fuel impacts**
- ▶ **“Place holder” performance incentive is same as current plan**
- ▶ **There is a lot to do to get a final plan together**

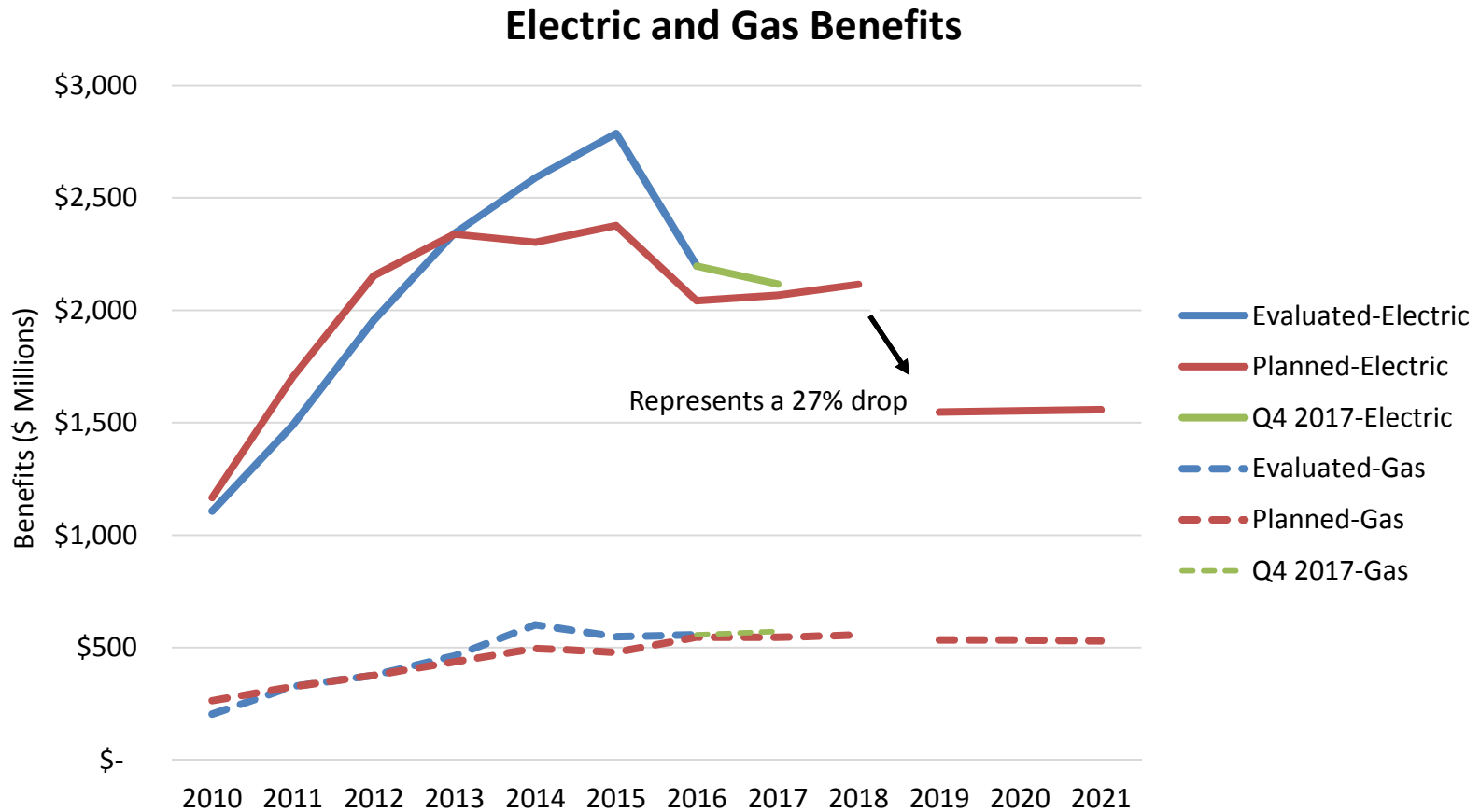
2019-2021 PLAN PORTFOLIO SUMMARY

| Electric | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|-------------------------------------|------------------------|-----------------------|------------|------------|-------------|------------|
| | Lifetime Savings (MWh) | 14,163,025 | 9,806,017 | 9,669,240 | 9,482,442 | 28,957,699 |
| Lifetime Savings (MMBtu) | 37,369,737 | 34,609,995 | 34,053,736 | 34,227,358 | 102,891,089 | |
| Annual Savings (MWh) | 1,574,249 | 1,005,330 | 978,631 | 955,022 | 2,938,982 | |
| % of Annual Sales* | 3.4% | 2.2% | 2.1% | 2.0% | 2.1% | |
| Summer Capacity Savings w/ ADM (kW) | 228,530 | 180,711 | 208,371 | 242,295 | 631,377 | |
| Benefits (\$ millions) | \$2,117 | \$1,547 | \$1,552 | \$1,558 | \$4,656 | |
| Expenditures (\$ millions) | \$529 | \$546 | \$546 | \$546 | \$1,638 | |
| Lifetime \$/kWh | \$0.037 | \$0.056 | \$0.056 | \$0.058 | \$0.057 | |

| Gas | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|----------------------------|---------------------------|-----------------------|-------------|-------------|-------------|---------------|
| | Lifetime Savings (Therms) | 368,345,795 | 342,404,319 | 343,333,276 | 339,424,887 | 1,025,162,483 |
| Annual Savings (Therms) | 26,621,107 | 26,654,591 | 26,810,531 | 26,682,210 | 80,147,332 | |
| % of Annual Sales* | 1.2% | 1.1% | 1.1% | 1.1% | 1.1% | |
| Benefits (\$ millions) | \$572 | \$534 | \$534 | \$529 | \$1,597 | |
| Expenditures (\$ millions) | \$205 | \$227 | \$230 | \$234 | \$691 | |
| Lifetime \$/therm | \$0.557 | \$0.662 | \$0.670 | \$0.691 | \$0.674 | |

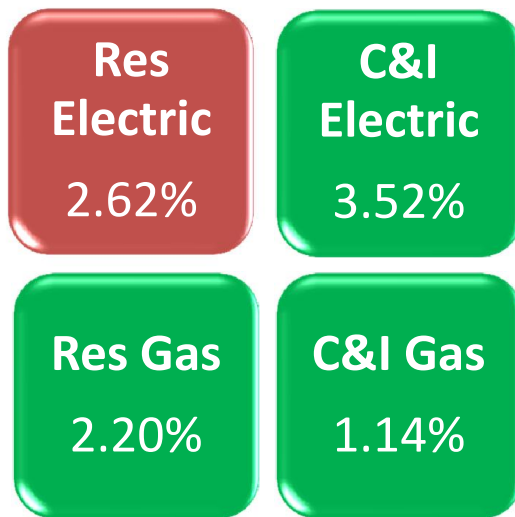
*Years 2019-2021 use 2018 as sales reference

PORTFOLIO BENEFITS ARE LOWER THAN RECENT YEARS

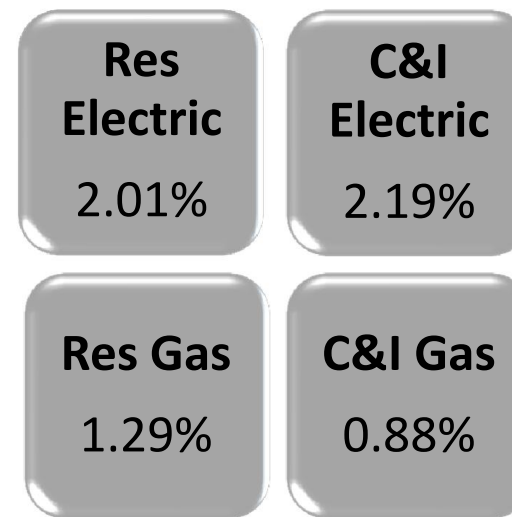


PA PLAN SAVINGS AS A % OF SALES ARE LOWER THAN CONSULTANT ASSESSMENT OF POTENTIAL

Consultant Team Assessment of Potential



PA Draft Plan



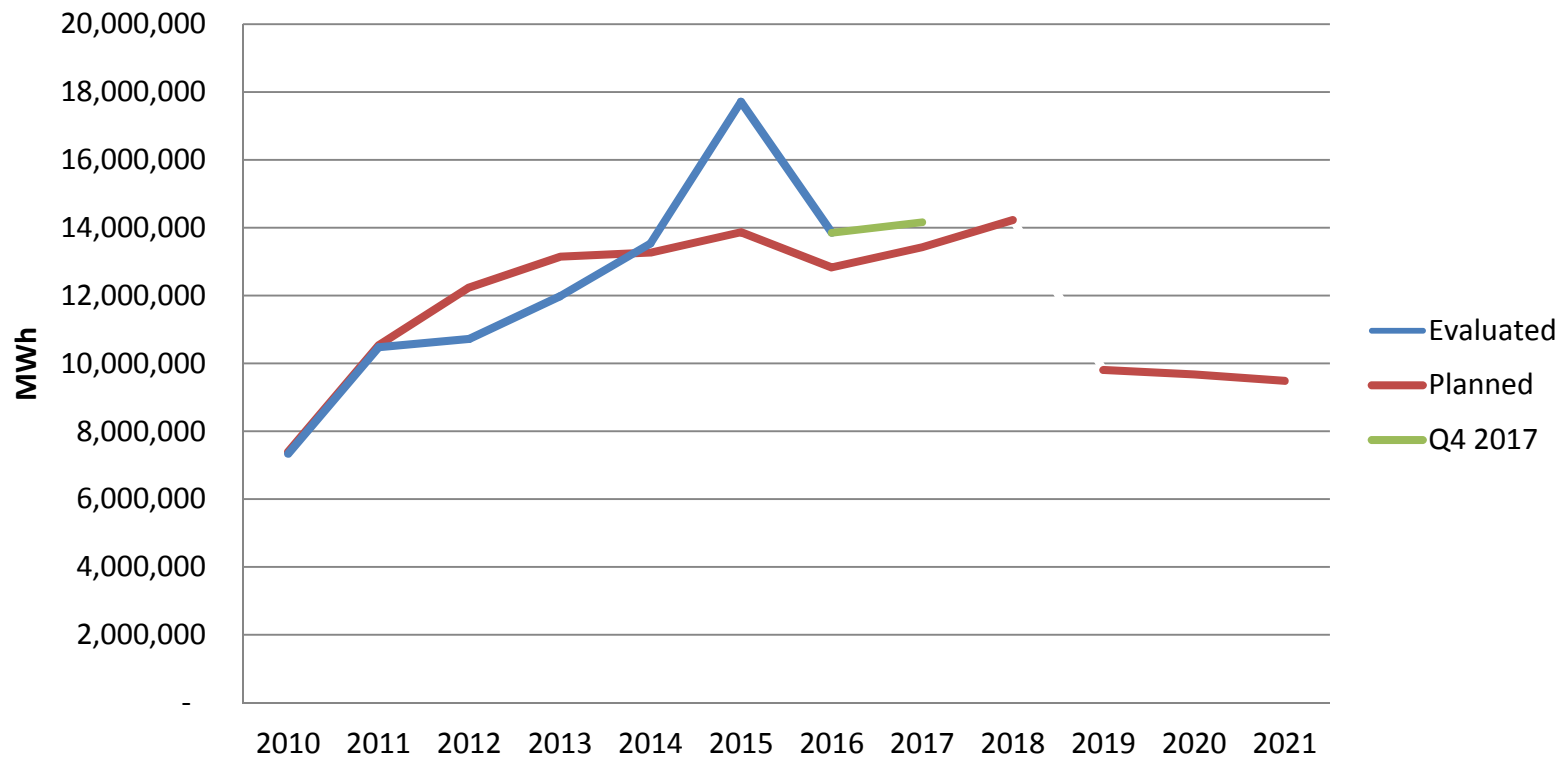
Note: 2018 used as sales reference for PA Plan



ELECTRIC

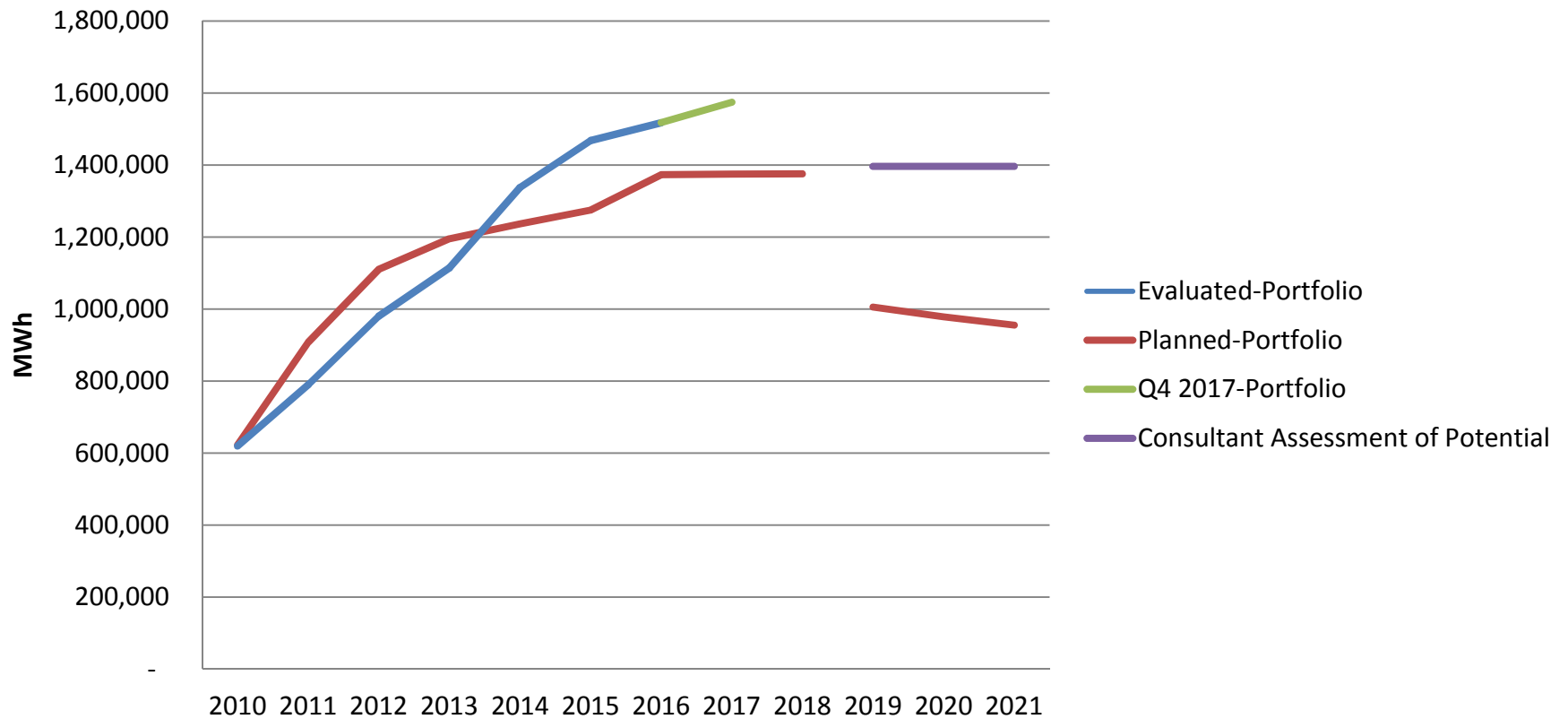
PLANNED LIFETIME ELECTRIC SAVINGS ARE LOWEST SINCE 2010

Portfolio Lifetime Electric Savings



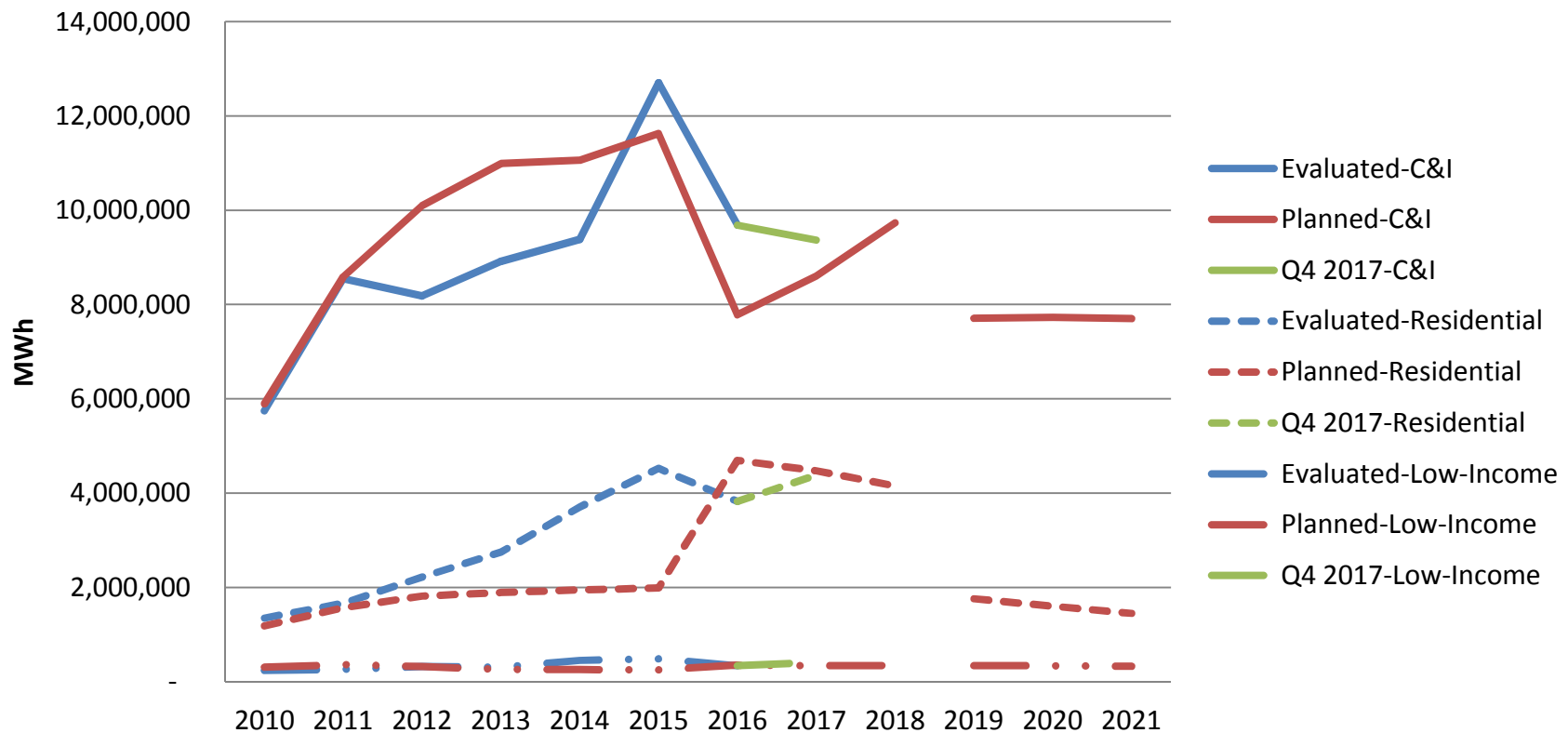
ANNUAL ELECTRIC SAVINGS LOWER THAN RECENT YEARS AND LOWER THAN ASSESSMENT OF POTENTIAL

Portfolio Annual Electric Savings

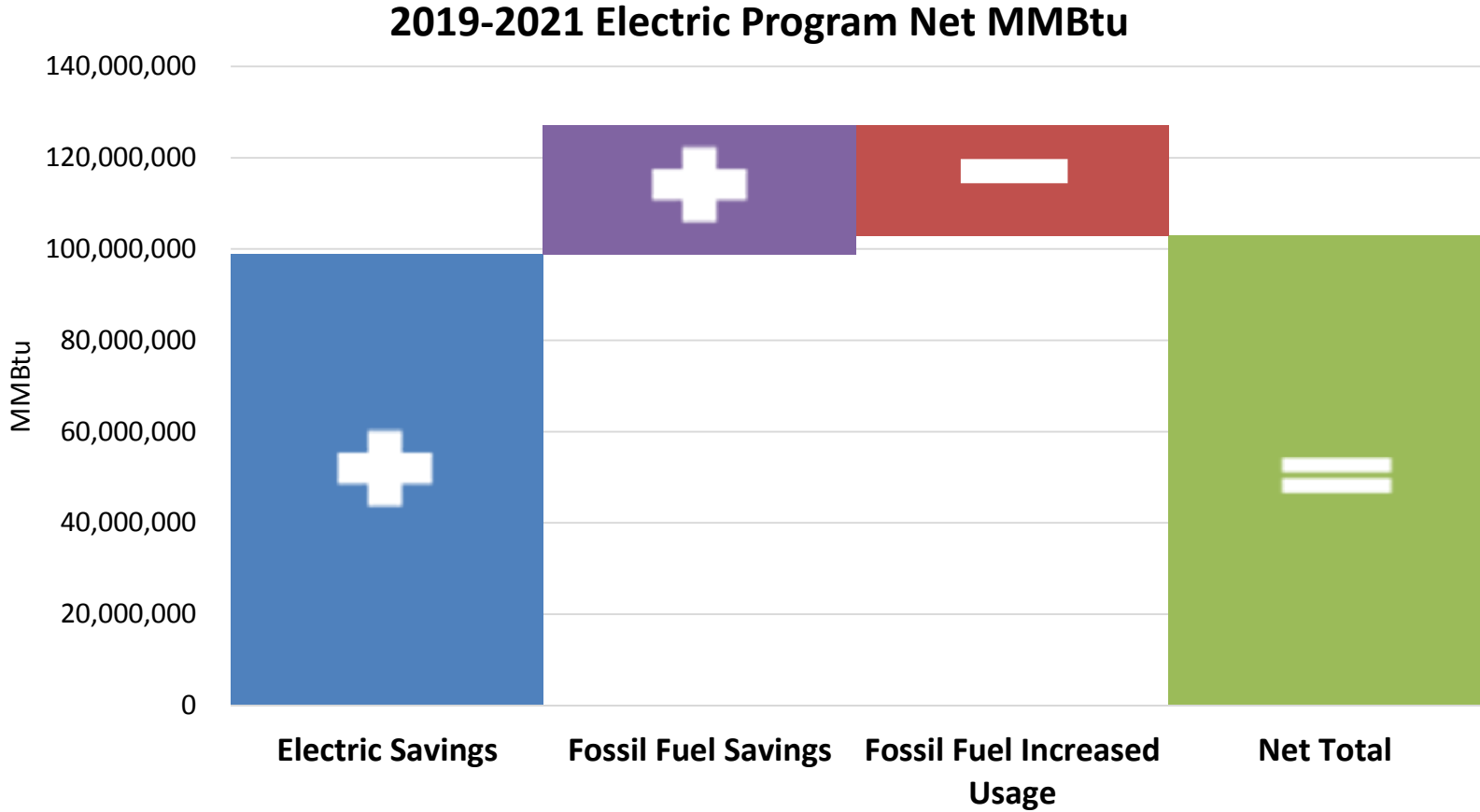


LIFETIME ELECTRIC SAVINGS LOWER THAN PREVIOUS PLAN FOR ALL SECTORS; BIGGEST DROP FOR RESIDENTIAL

Lifetime Electric Savings by Sector

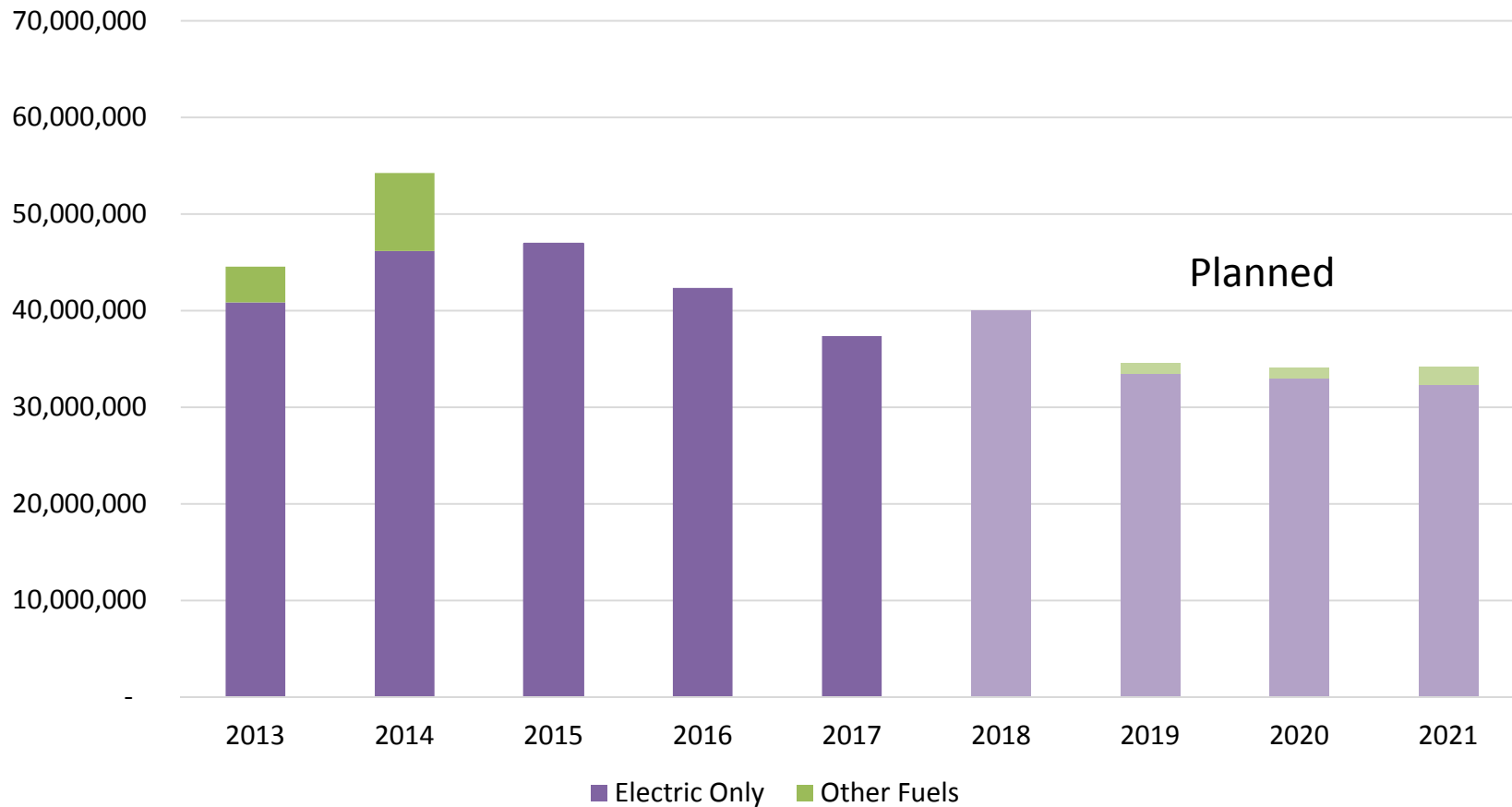


2019-2021 NET MMBTU SAVINGS ARE HIGHER THAN ELECTRIC ONLY

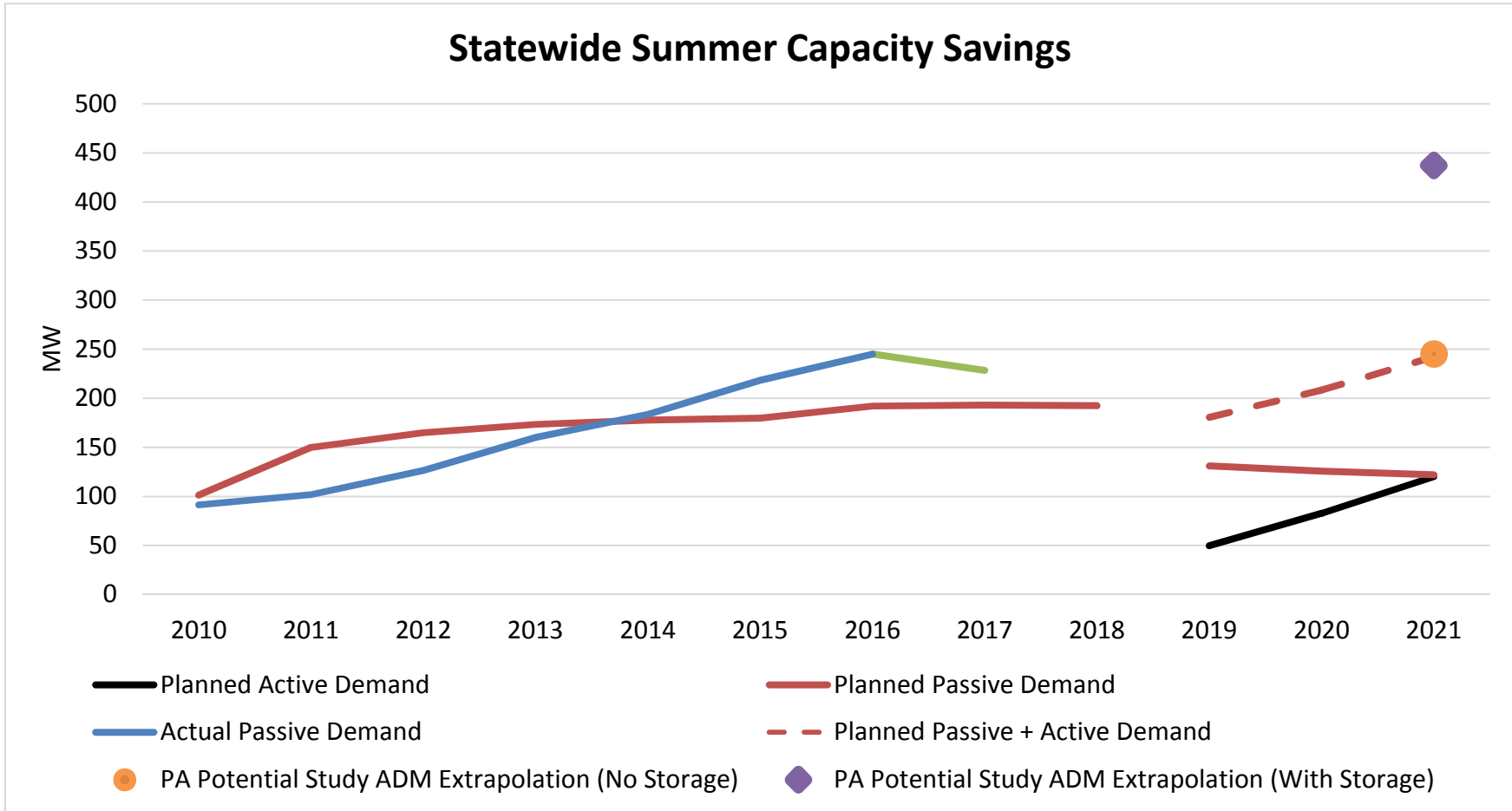


OTHER FUEL IMPACTS ON NET ELECTRIC PROGRAM SAVINGS VARY BY YEAR

Electric Program Lifetime Savings (MMBtu)

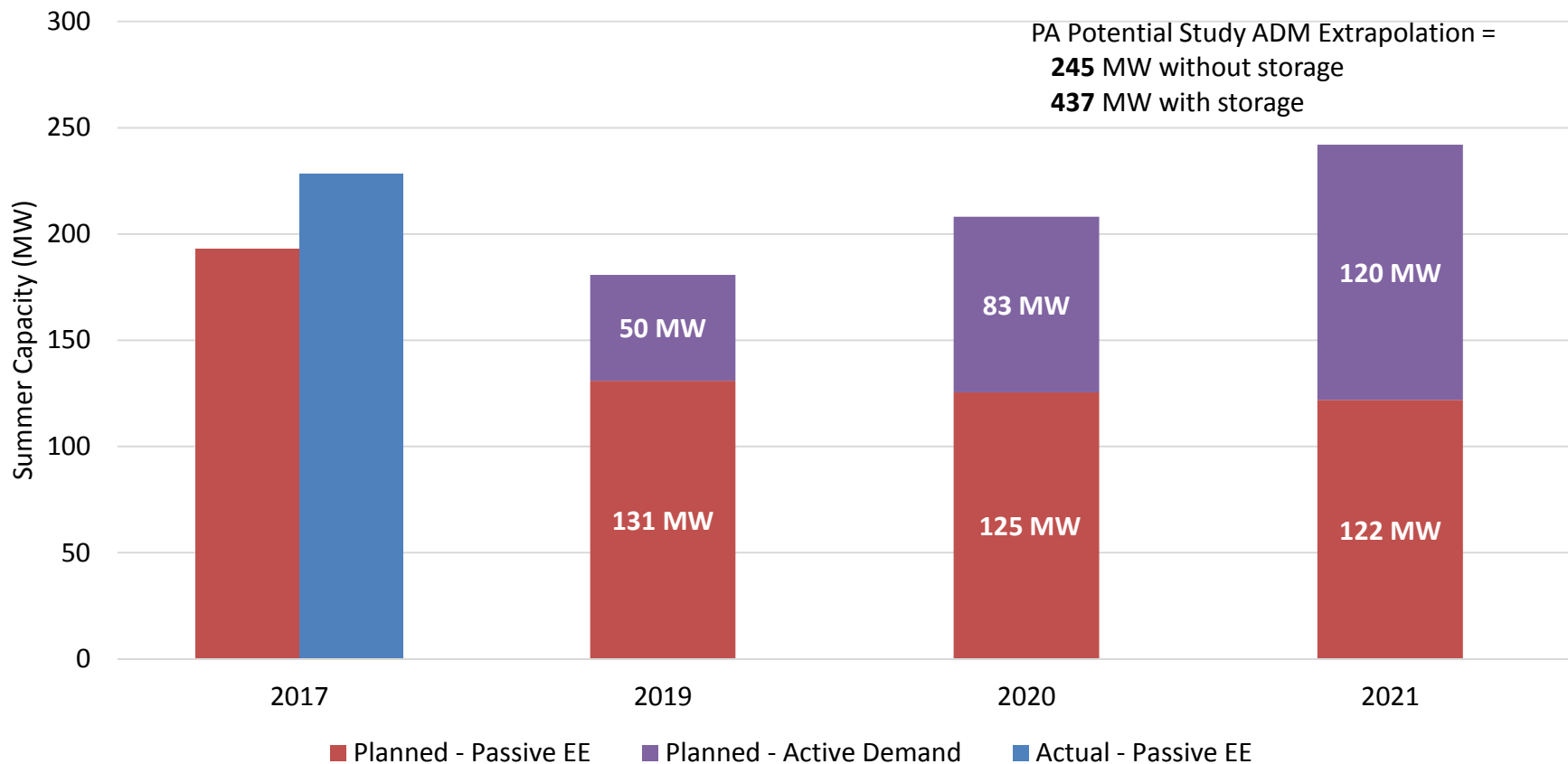


PASSIVE DEMAND SAVINGS TRENDS AND PROPOSED ACTIVE DEMAND MANAGEMENT



PASSIVE AND ACTIVE PEAK SUMMER DEMAND IMPACTS

Passive (EE) and Active Demand Impacts

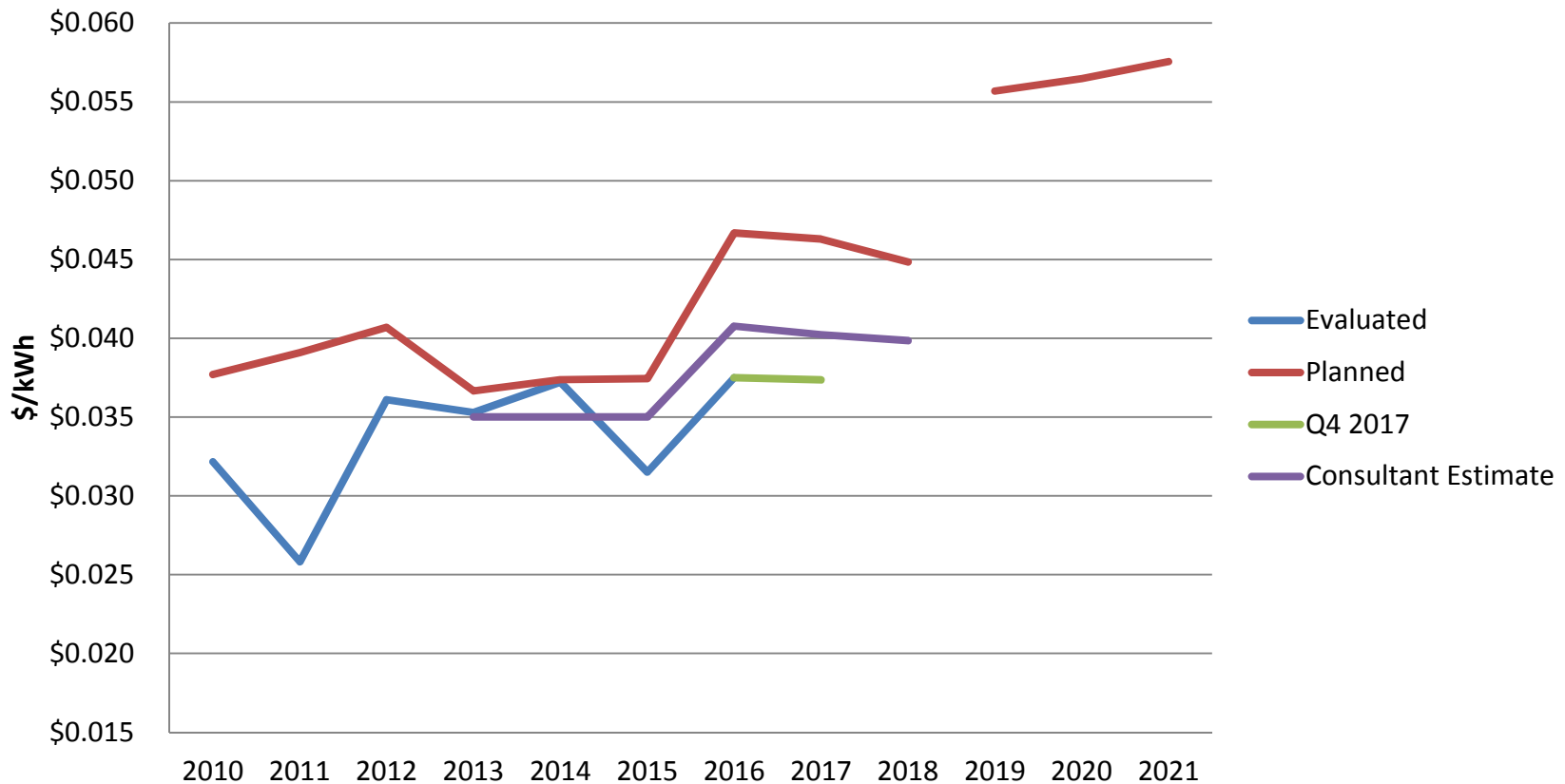


ADM STRATEGIES AND PURPOSES: WHAT SHOULD BE IN 2019-2021 PLAN?

- ▶ **Plan should include several kinds of active demand management (ADM) to address several objectives**
 - ADM useful for ramping, operational needs, shortage events in addition to peak demand reductions
 - Not limited solely to products bid into markets
- ▶ ***Winter* peak demand important in addition to summer**
- ▶ **Automation and advances in technology enable customers to manage load in new ways**
- ▶ **Plan needs to consider new and broader purposes**
- ▶ ***Key questions:***
 - *How much ADM does MA need/want, when, and why (for which purposes)?*
 - *What ADM is needed/valuable in addition to system peak reduction?*

2019-2021 PLANNED LIFETIME ELECTRIC COST TO ACHIEVE ARE MUCH HIGHER THAN PREVIOUS YEARS

Portfolio Lifetime Electric Cost to Achieve



ELECTRIC SAVINGS AS A % OF SALES VARY BY PA AND SECTOR

| Electric | | | | | |
|--------------------|-------|------------|---------------|--------|-----------|
| | CLC | Eversource | National Grid | Unitil | Statewide |
| Total | | | | | |
| 2019 | 1.43% | 2.17% | 2.23% | 1.39% | 2.16% |
| 2020 | 1.36% | 2.16% | 2.12% | 1.42% | 2.10% |
| 2021 | 1.31% | 2.09% | 2.09% | 1.43% | 2.05% |
| 2019-2021 | 1.37% | 2.14% | 2.15% | 1.41% | 2.10% |
| Residential | | | | | |
| 2019 | 1.01% | 1.92% | 2.56% | 1.34% | 2.18% |
| 2020 | 0.86% | 1.76% | 2.37% | 1.49% | 2.01% |
| 2021 | 0.78% | 1.59% | 2.20% | 1.46% | 1.85% |
| 2019-2021 | 0.88% | 1.76% | 2.38% | 1.43% | 2.01% |
| Low Income | | | | | |
| 2019 | 3.55% | 2.09% | 1.34% | 0.18% | 1.61% |
| 2020 | 3.51% | 2.04% | 1.35% | 0.20% | 1.60% |
| 2021 | 3.32% | 2.00% | 1.34% | 0.20% | 1.57% |
| 2019-2021 | 3.46% | 2.04% | 1.35% | 0.19% | 1.59% |
| C&I | | | | | |
| 2019 | 1.78% | 2.28% | 2.11% | 1.70% | 2.19% |
| 2020 | 1.81% | 2.33% | 2.06% | 1.68% | 2.19% |
| 2021 | 1.80% | 2.31% | 2.09% | 1.71% | 2.19% |
| 2019-2021 | 1.80% | 2.31% | 2.09% | 1.70% | 2.19% |

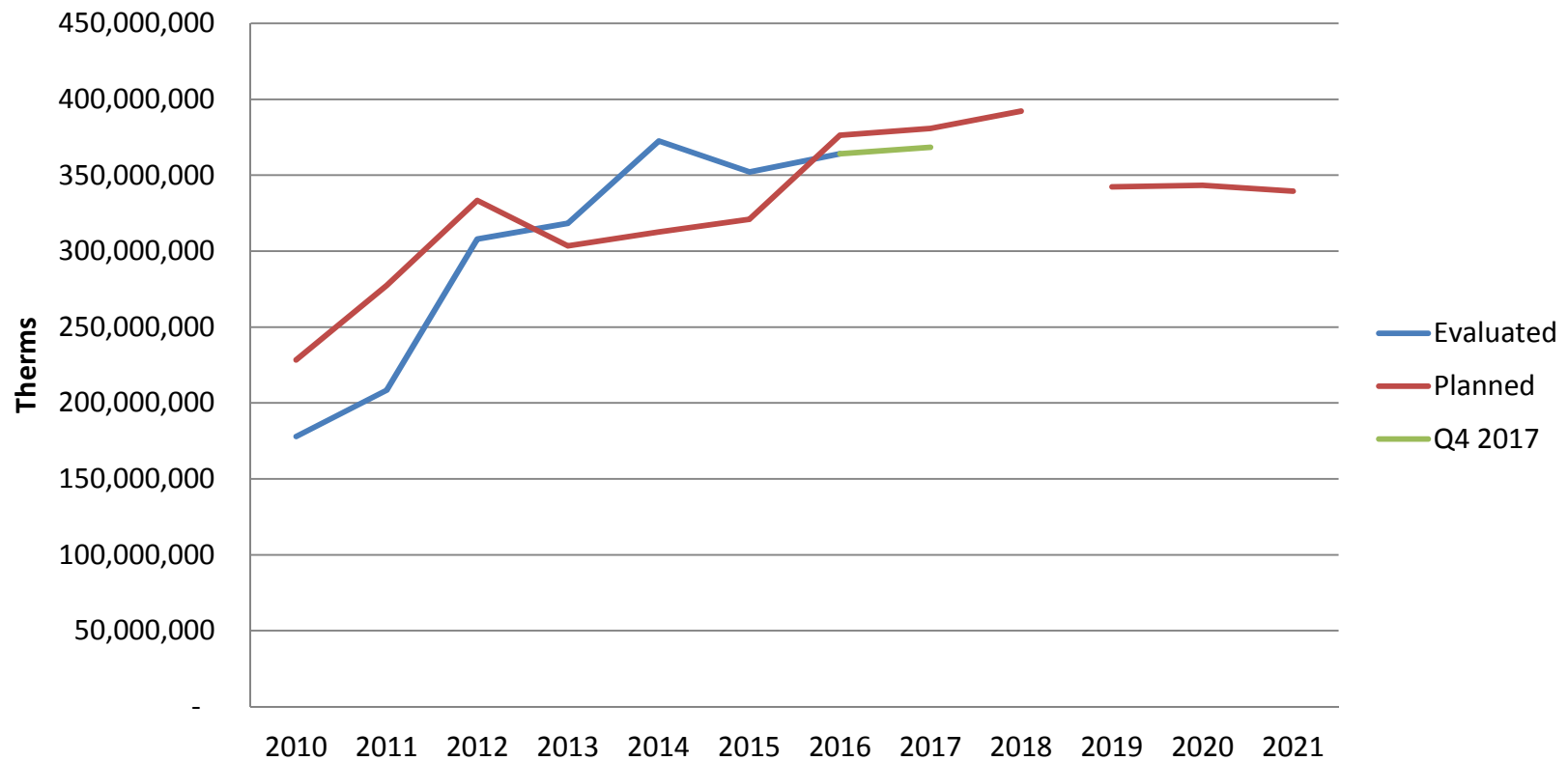
Note: Years 2019-2021 use 2018 as sales reference



GAS

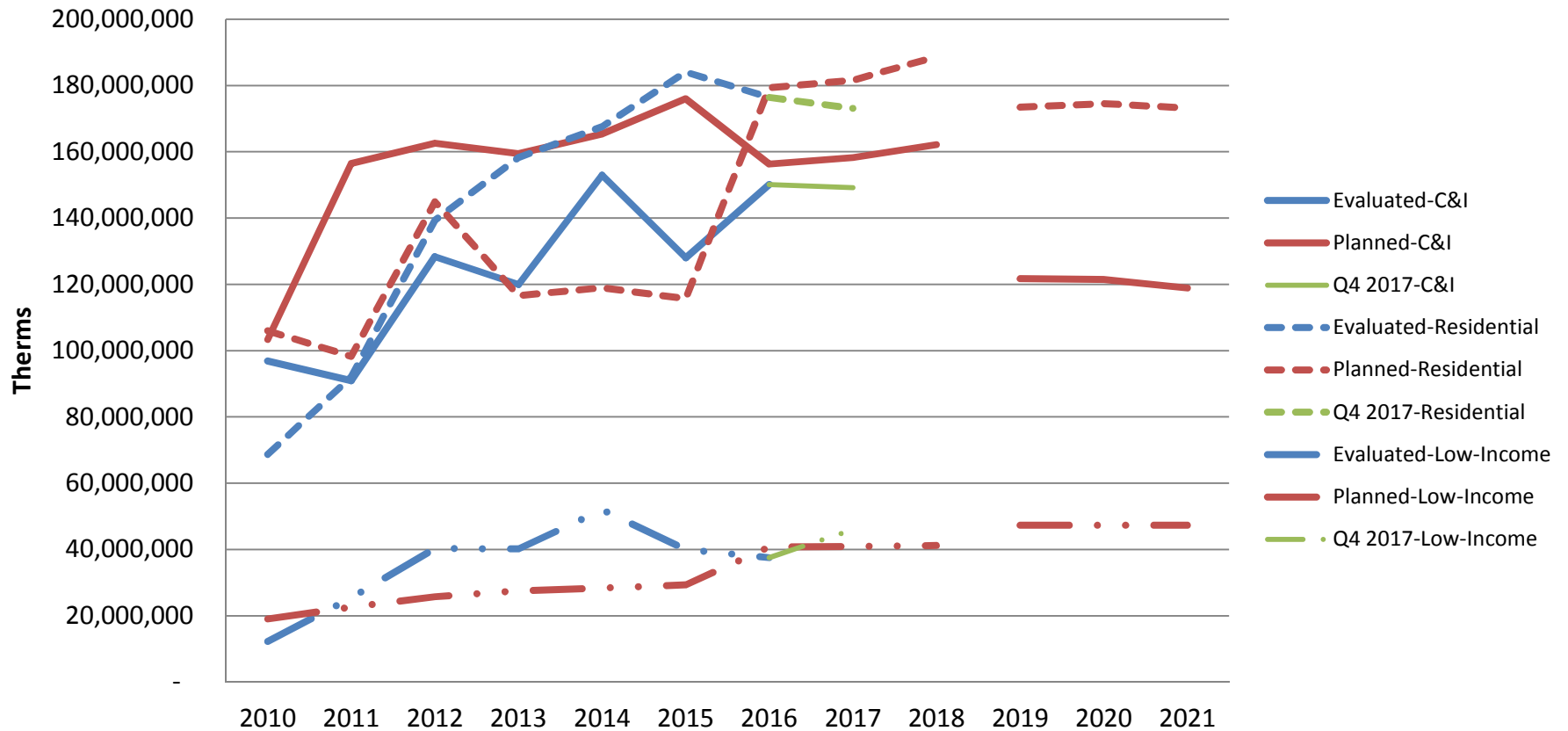
LIFETIME GAS SAVINGS ARE LOWER THAN PREVIOUS PLAN

Portfolio Lifetime Gas Savings

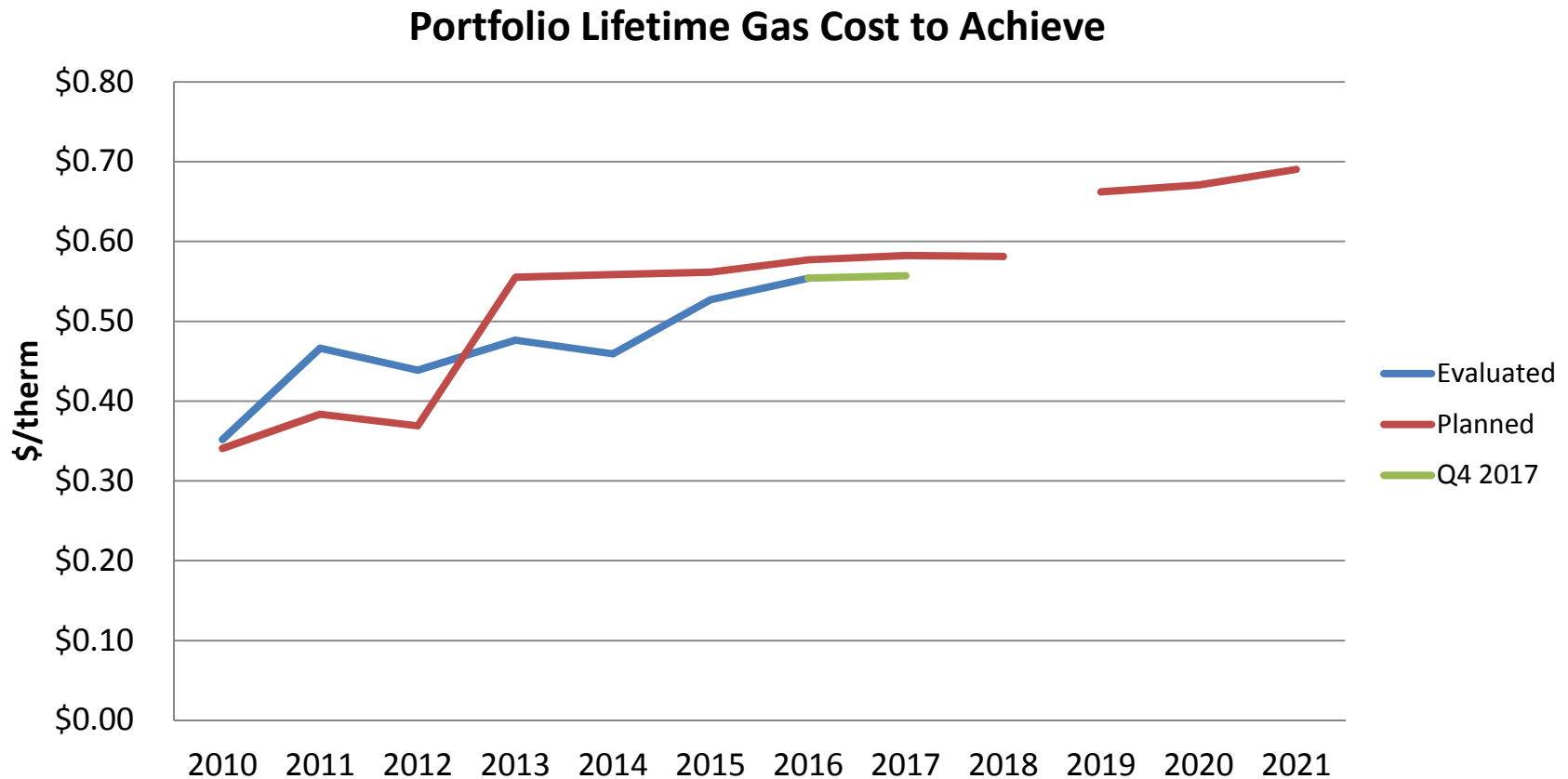


LIFETIME GAS SAVINGS LOWER THAN PREVIOUS PLAN FOR RES AND C&I; BIGGEST DROP FOR C&I

Lifetime Gas Savings by Sector



LIFETIME GAS COST TO ACHIEVE IS HIGHER THAN PREVIOUS YEARS



GAS SAVINGS AS A % OF SALES VARY BY PA AND SECTOR

| Gas | | | | | | | |
|--------------------|-----------|-------|------------|---------|---------------|--------|-----------|
| | Berkshire | CMA | Eversource | Liberty | National Grid | Unitil | Statewide |
| Total | | | | | | | |
| 2019 | 0.38% | 1.32% | 1.29% | 0.61% | 1.11% | 0.84% | 1.14% |
| 2020 | 0.37% | 1.32% | 1.29% | 0.60% | 1.12% | 0.87% | 1.15% |
| 2021 | 0.38% | 1.33% | 1.29% | 0.60% | 1.11% | 0.87% | 1.14% |
| 2019-2021 | 0.38% | 1.32% | 1.29% | 0.60% | 1.12% | 0.86% | 1.14% |
| Residential | | | | | | | |
| 2019 | 0.38% | 1.04% | 1.39% | 0.71% | 1.40% | 1.17% | 1.29% |
| 2020 | 0.37% | 1.05% | 1.39% | 0.72% | 1.40% | 1.26% | 1.29% |
| 2021 | 0.37% | 1.06% | 1.39% | 0.73% | 1.38% | 1.25% | 1.29% |
| 2019-2021 | 0.37% | 1.05% | 1.39% | 0.72% | 1.39% | 1.23% | 1.29% |
| Low Income | | | | | | | |
| 2019 | 0.58% | 1.21% | 1.73% | 0.34% | 3.50% | 0.77% | 2.09% |
| 2020 | 0.58% | 1.21% | 1.73% | 0.34% | 3.50% | 0.77% | 2.09% |
| 2021 | 0.58% | 1.21% | 1.73% | 0.34% | 3.50% | 0.77% | 2.09% |
| 2019-2021 | 0.58% | 1.21% | 1.73% | 0.34% | 3.50% | 0.77% | 2.09% |
| C&I | | | | | | | |
| 2019 | 0.35% | 1.96% | 1.18% | 0.58% | 0.63% | 0.65% | 0.88% |
| 2020 | 0.35% | 1.96% | 1.18% | 0.55% | 0.65% | 0.66% | 0.89% |
| 2021 | 0.35% | 1.96% | 1.18% | 0.53% | 0.64% | 0.66% | 0.89% |
| 2019-2021 | 0.35% | 1.96% | 1.18% | 0.55% | 0.64% | 0.66% | 0.88% |

Note: Years 2019-2021 use 2018 as sales reference



C&I

2019-2021 PLAN C&I SAVINGS SUMMARY

| Electric | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|-------------------------------------|------------------------|-----------------------|------------|------------|------------|------------|
| | Lifetime Savings (MWh) | 9,363,881 | 7,703,829 | 7,726,675 | 7,703,217 | 23,133,721 |
| Lifetime Savings (MMBtu) | 16,860,477 | 18,167,271 | 18,170,346 | 18,436,441 | 54,774,058 | |
| Annual Savings (MWh) | 693,842 | 632,194 | 632,531 | 634,110 | 1,898,835 | |
| % of Annual Sales | 2.4% | 2.2% | 2.2% | 2.2% | 2.2% | |
| Summer Capacity Savings w/ ADM (kW) | 99,940 | 116,981 | 141,646 | 177,468 | 436,095 | |
| Benefits (\$ millions) | \$1,216 | \$916 | \$918 | \$933 | \$2,767 | |
| Expenditures (\$ millions) | \$237 | \$257 | \$264 | \$269 | \$790 | |
| Lifetime \$/kWh | \$0.025 | \$0.033 | \$0.034 | \$0.035 | \$0.034 | |

| Gas | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|----------------------------|---------------------------|-----------------------|-------------|-------------|-------------|-------------|
| | Lifetime Savings (Therms) | 149,214,169 | 121,655,134 | 121,449,800 | 118,891,357 | 361,996,290 |
| Annual Savings (Therms) | 10,481,087 | 9,452,799 | 9,553,141 | 9,514,981 | 28,520,920 | |
| % of Annual Sales* | 1.0% | 0.9% | 0.9% | 0.9% | 0.9% | |
| Benefits (\$ millions) | \$159 | \$134 | \$134 | \$131 | \$399 | |
| Expenditures (\$ millions) | \$44 | \$45 | \$46 | \$47 | \$138 | |
| Lifetime \$/therm | \$0.295 | \$0.372 | \$0.378 | \$0.392 | \$0.381 | |

*Years 2019-2021 use 2018 as sales reference

C&I KEY CONSIDERATIONS



▶ **Lighting savings**

- Maximize lighting savings by supporting fixtures with controls
- Drive increased specification and controls installation

▶ **HVAC and Controls/Hot water**

- Revisit Upstream program
- Increase RCx and MCx
- Better integrate gas and electric savings

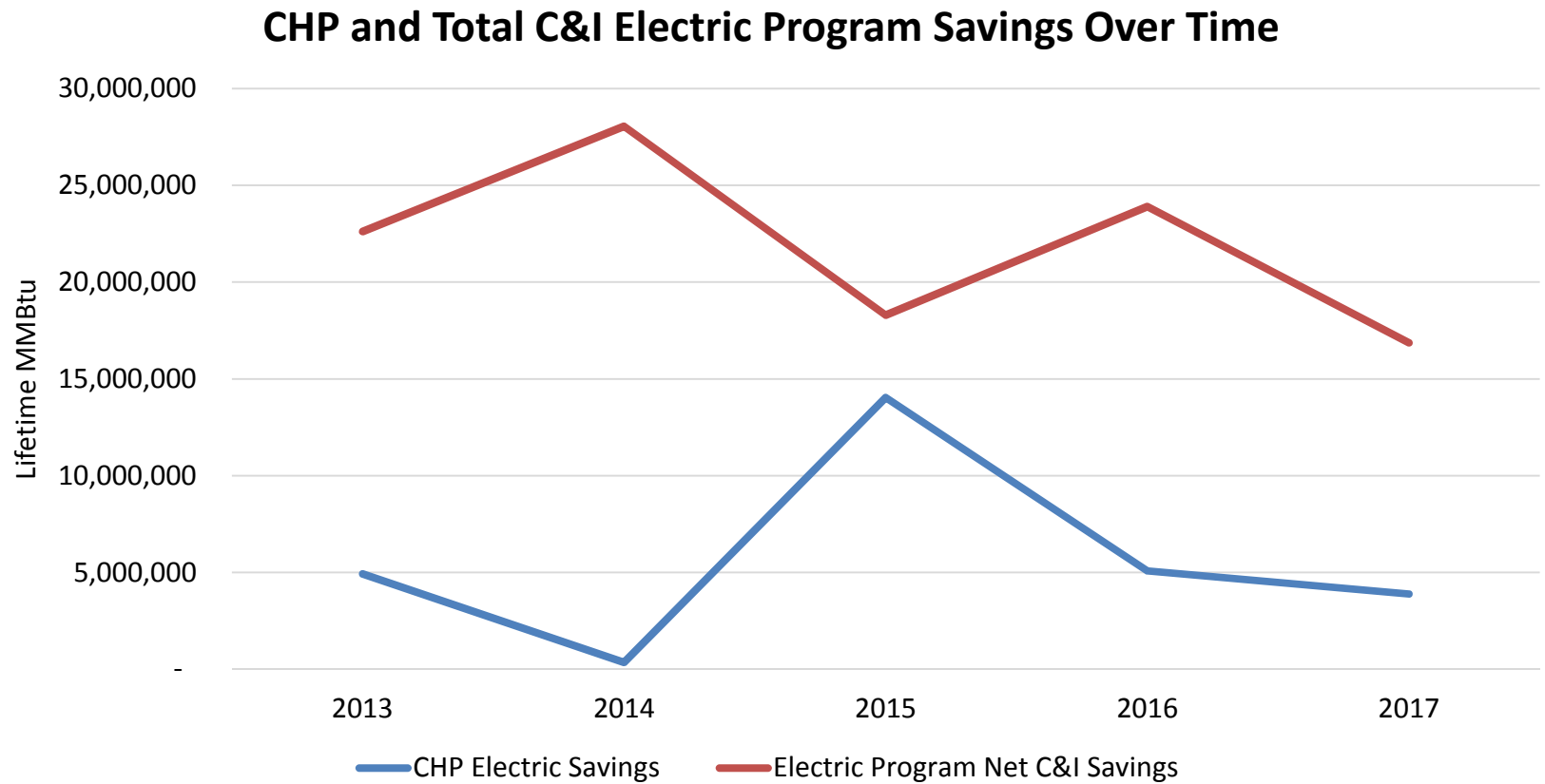
▶ **Process savings**

- Increase Industrial Initiative capacity and approaches

▶ **CHP**

- Identify and weight three-year pipeline
- MMBtu metric impact

CHP SAVINGS TRACK IN OPPOSITE DIRECTION AS TOTAL C&I ELECTRIC PROGRAM SAVINGS





RESIDENTIAL AND LOW INCOME

2019-2021 PLAN RESIDENTIAL SAVINGS SUMMARY

| Electric | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|-------------------------------------|------------------------|-----------------------|------------|------------|------------|-----------|
| | Lifetime Savings (MWh) | 4,380,416 | 1,763,658 | 1,604,768 | 1,452,466 | 4,820,892 |
| Lifetime Savings (MMBtu) | 17,408,892 | 13,766,317 | 13,200,174 | 13,132,553 | 40,099,043 | |
| Annual Savings (MWh) | 835,748 | 337,802 | 310,956 | 286,332 | 935,090 | |
| % of Annual Sales* | 5.4% | 2.2% | 2.0% | 1.9% | 2.0% | |
| Summer Capacity Savings w/ ADM (kW) | 122,421 | 58,399 | 61,738 | 59,999 | 180,136 | |
| Benefits (\$ millions) | \$756 | \$503 | \$507 | \$498 | \$1,509 | |
| Expenditures (\$ millions) | \$228 | \$221 | \$212 | \$207 | \$640 | |
| Lifetime \$/kWh | \$0.052 | \$0.125 | \$0.132 | \$0.142 | \$0.133 | |

| Gas | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|----------------------------|---------------------------|-----------------------|-------------|-------------|-------------|-------------|
| | Lifetime Savings (Therms) | 173,103,171 | 173,435,584 | 174,568,609 | 173,218,664 | 521,222,857 |
| Annual Savings (Therms) | 13,869,444 | 14,842,835 | 14,898,435 | 14,808,274 | 44,549,544 | |
| % of Annual Sales* | 1.2% | 1.3% | 1.3% | 1.3% | 1.3% | |
| Benefits (\$ millions) | \$320 | \$307 | \$307 | \$306 | \$920 | |
| Expenditures (\$ millions) | \$115 | \$132 | \$134 | \$137 | \$403 | |
| Lifetime \$/therm | \$0.666 | \$0.760 | \$0.769 | \$0.791 | \$0.773 | |

*Years 2019-2021 use 2018 as sales reference

2019-2021 PLAN LOW INCOME SAVINGS SUMMARY

| Electric | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|-------------------------------------|------------------------|-----------------------|-----------|-----------|-----------|-----------|
| | Lifetime Savings (MWh) | 418,727 | 338,530 | 337,797 | 326,759 | 1,003,086 |
| Lifetime Savings (MMBtu) | 3,100,369 | 2,676,407 | 2,683,216 | 2,658,365 | 8,017,988 | |
| Annual Savings (MWh) | 44,659 | 35,335 | 35,143 | 34,579 | 105,058 | |
| % of Annual Sales* | 2.1% | 1.6% | 1.6% | 1.6% | 1.6% | |
| Summer Capacity Savings w/ ADM (kW) | 6,170 | 5,331 | 4,988 | 4,828 | 15,146 | |
| Benefits (\$ millions) | \$146 | \$127 | \$127 | \$126 | \$380 | |
| Expenditures (\$ millions) | \$64 | \$68 | \$69 | \$70 | \$208 | |
| Lifetime \$/kWh | \$0.153 | \$0.202 | \$0.206 | \$0.214 | \$0.207 | |

| Gas | | 2017 (Preliminary) | 2019 | 2020 | 2021 | 2019-2021 |
|----------------------------|---------------------------|-----------------------|------------|------------|------------|-------------|
| | Lifetime Savings (Therms) | 46,028,455 | 47,313,601 | 47,314,867 | 47,314,867 | 141,943,335 |
| Annual Savings (Therms) | 2,270,577 | 2,358,956 | 2,358,956 | 2,358,956 | 7,076,868 | |
| % of Annual Sales* | 2.0% | 2.1% | 2.1% | 2.1% | 2.1% | |
| Benefits (\$ millions) | \$93 | \$93 | \$93 | \$92 | \$278 | |
| Expenditures (\$ millions) | \$46 | \$50 | \$50 | \$51 | \$150 | |
| Lifetime \$/therm | \$0.993 | \$1.049 | \$1.059 | \$1.072 | \$1.060 | |

*Years 2019-2021 use 2018 as sales reference

RES/LOW INCOME KEY CONSIDERATIONS



- ▶ **Residential existing buildings program**
 - Audit process
 - Role of technology in 2019-2021 for res customers
 - Behavior program assumptions
 - Co-delivery of PV, EV
- ▶ **Lighting assumptions across programs and over time**
- ▶ **Other ratepayer parity considerations**
 - Multi-family, moderate income, renters, other hard to find/reach/serve ratepayers
- ▶ **Low income**
 - PA differences
 - Details on market rate alignment
 - Data collection and management



CROSS-CUTTING

CROSS-CUTTING KEY CONSIDERATIONS



- ▶ **Goals and goals framework (MMBTUs & primary fuel)**
- ▶ **Energy optimization, fuel switching**
- ▶ **Demand and active demand management**
 - Goal(s)
 - Strategic positioning and value, for which purposes
 - Customer-facing program delivery (integrated EE and ADM)
- ▶ **Application of 2018 AESC study results in MA**
 - Avoided cost of GWSA compliance (MA analysis)
 - Pool Transmission Facility T&D, and utility system T&D
 - Rest-of-pool (ROP) DRIPE in addition to in-state DRIPE
- ▶ **Market transformation/market effects credit**
- ▶ **Performance incentive**
- ▶ **Application of EM&V results (Net-to-Gross, baselines)**

CONCLUSIONS AND NEXT STEPS

- ▶ **More detail needed in Plan to respond to many EEAC recommendations**
- ▶ **Benefits and savings lower than current plan while costs to achieve are higher than expected**
- ▶ **No large change in program measure mix or delivery**
- ▶ **Variation in planning assumptions among PAs**
- ▶ **Need to retain kWh and therm metrics**
- ▶ **Performance incentive is the same as current plan**
- ▶ **ADM included but very limited energy storage**
- ▶ **There is a lot to do to get a final plan together**
- ▶ **Next step will be to engage in key drivers process which will require PA participation and commitment**

THANK YOU

Questions?

LIFETIME COST TO ACHIEVE BY PA

| Electric | \$/kWh | | | | |
|----------|------------------------|---------|---------|---------|-----------|
| | | 2019 | 2020 | 2021 | 2019-2021 |
| | Cape Light Compact | \$0.124 | \$0.137 | \$0.139 | \$0.134 |
| | Eversource | \$0.052 | \$0.052 | \$0.054 | \$0.053 |
| | National Grid Electric | \$0.054 | \$0.055 | \$0.055 | \$0.055 |
| | Unitil Electric | \$0.080 | \$0.080 | \$0.079 | \$0.080 |
| | Total | \$0.056 | \$0.056 | \$0.058 | \$0.057 |

| Gas | \$/therm | | | | |
|-----|--------------------|---------|---------|---------|-----------|
| | | 2019 | 2020 | 2021 | 2019-2021 |
| | Berkshire Gas | \$0.736 | \$0.751 | \$0.745 | \$0.744 |
| | Columbia Gas of MA | \$0.560 | \$0.566 | \$0.579 | \$0.568 |
| | Eversource | \$0.614 | \$0.628 | \$0.643 | \$0.628 |
| | Liberty Utilities | \$0.623 | \$0.647 | \$0.651 | \$0.640 |
| | National Grid | \$0.723 | \$0.730 | \$0.759 | \$0.737 |
| | Unitil | \$0.803 | \$0.798 | \$0.785 | \$0.795 |
| | Total | \$0.662 | \$0.670 | \$0.691 | \$0.674 |