PREPARED BY GDS

NIPSCO

NORTHERN INDIANA PUBLIC SERVICE

Demand Side Management Market Potential Study

EXECUTIVE SUMMARY

2021

GDS Associates, Inc.
ENGINEERS & CONSULTANTS

Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

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1 Executive Summary

1.1 OBJECTIVES & SCOPE

This Market Potential Study ("MPS") was conducted to support the Integrated Resource Plan (IRP) and DSM planning for NIPSCO. The study included primary market research and a comprehensive review of current programs, historical savings, and projected energy savings opportunities in order to develop estimates of technical, economic, and achievable potential. This executive summary discusses the analysis and results for both the electric and natural gas energy efficiency potential analyses, as well as the demand response potential analysis. The effort was highly collaborative, as the GDS Team worked closely alongside the NIPSCO Oversight Board (OSB) to produce reliable estimates of future savings potential, using the best available information and best practices for developing market potential savings estimates.

1.2 MARKET RESEARCH

The initial step in the assessment of future potential was to develop a clear understanding of the current market segments, as well as a clear understanding of the market research data available in the NIPSCO service territory. In late 2019 and early 2020, Skill Demand Energy was retained by GDS to conduct the primary market research that would inform critical elements of the MPS. The research objectives were developed in coordination with NIPSCO and the potential study team. Primary market research activities were focused on collecting updated equipment penetration, saturation, and efficiency characteristics, and customer willingness to participate ("WTP") in program offerings across select end-uses/measures. A list of all market research activities included in the study is provided below:

- Residential online/mail-in survey
- Residential on-site survey
- Commercial on-site survey
- Residential/commercial WTP data

The resulting data was used to develop updated estimates of baseline and efficient equipment saturation estimates in the market potential study and to develop expected long-term adoption rates for energy efficiency over the study horizon.

1.3 ENERGY EFFICIENCY

This section provides an overview of the approach to the energy efficiency potential analysis as well as separate results summaries for the electric and natural gas studies.

1.3.1 Summary of Approach

The scope of the energy efficiency potential study distinguishes three types of energy efficiency potential: (1) technical, (2) economic, and (3) achievable.

- ***Technical Potential*** is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints, such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is constrained only by factors such as technical feasibility and applicability of measures.
- ***Economic Potential*** refers to the subset of the technical potential that is economically cost-effective as compared to conventional supply-side energy resources. Economic potential follows the same

adoption rates as technical potential. Like technical potential, the economic scenario ignores market barriers to ensuring actual implementation of efficiency. Finally, economic potential only considers the costs of efficiency measures themselves, ignoring any programmatic costs (e.g., marketing, analysis, administration) that would be necessary to capture them. This energy efficiency analysis uses the Utility Cost Test (UCT) to assess cost-effectiveness.

- ***Achievable Potential*** is the amount of energy that can realistically be saved given various market barriers. Achievable potential considers real-world barriers to encouraging end users to adopt efficiency measures; the non-measure costs of delivering programs (for administration, marketing, analysis, and EM&V); and the capability of programs and administrators to boost program activity over time. Barriers include financial constraints, customer awareness and willingness to participate in programs, technical constraints, and other barriers that the "program intervention" is modeled to overcome. The potential study evaluated two achievable potential scenarios:
- ***Maximum Achievable Potential (MAP)*** estimates achievable potential with NIPSCO paying incentives equal to 100% of measure incremental costs, as well as aggressive adoption rates from aggressive customer education and program marketing.
- ***Realistic Achievable Potential (RAP)*** estimates achievable potential with NIPSCO paying incentive levels (as a percent of incremental measure costs) closely calibrated to current levels, but is not constrained by any previously determined spending levels.

1.3.2 Eligible Opt-Out Electric Customers

In Indiana, commercial or industrial customers with a peak load greater than 1MW are eligible to opt out of utility-funded electric energy efficiency programs. In the NIPSCO service area, approximately 16% of commercial sales have opted out of utility-funded electric energy efficiency programs, while roughly 80% of industrial sales have opted out.[1]

The electric energy efficiency potential discussed in this volume focuses on the savings in the C&I sectors excluding sales from opt-out customers. Results of C&I sector potential in a scenario that includes savings from NIPSCO's opt-out customers are also provided in Section 6.6 of the Volume I: Electric Energy Efficiency Potential report.

1.3.3 Electric Energy Efficiency

Table 1-1 summarizes the electric energy efficiency savings. The table provides cumulative annual technical, economic, MAP and RAP potential energy savings, in total MWh and as a percentage of the sector-level sales forecast for the first three years of the analysis, as well as in the 10th and 20th year of the analysis. Over the study timeframe the cumulative technical potential rises to 34.2%. The cumulative RAP over the same timeframe reaches 15.8%.

[1] These percentages were calculated based on the 2017 NIPSCO non-residential customer data and 2017 billing history. Note: the total C&I sales were adjusted to shift select industrial sales into the commercial sector based on the identified building type and more applicable mapping to the commercial sector models for the MPS.

TABLE 1-1 CUMULATIVE ANNUAL ELECTRIC ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MWh					
Technical	390,015	711,817	1,027,215	2,423,853	2,918,730
Economic	367,040	674,447	977,578	2,307,268	2,778,446
MAP	138,667	259,789	387,180	1,318,704	1,970,501
RAP	125,403	227,865	329,133	925,818	1,343,983
Forecasted Sales	7,853,522	7,874,459	7,912,744	8,202,133	8,530,096
Energy Savings (as % of Forecast)					
Technical	5.0%	9.0%	13.0%	29.6%	34.2%
Economic	4.7%	8.6%	12.4%	28.1%	32.6%
MAP	1.8%	3.3%	4.9%	16.1%	23.1%
RAP	1.6%	2.9%	4.2%	11.3%	15.8%

Table 1-2 summarizes the electric demand savings resulting from energy efficiency. The table provides cumulative annual technical, economic, MAP and RAP potential demand savings, in total MW. The cumulative RAP reaches 288 MW over the next 20 years.

TABLE 1-2 CUMULATIVE ANNUAL ELECTRIC DEMAND POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MW					
Technical	92	174	252	609	723
Economic	81	151	220	545	670
MAP	26	51	77	312	511
RAP	23	42	62	188	288

Figure 1-1 provides the electric technical, economic, and achievable potential, by sector, by the end of the 20-year timeframe for the study (2024-2043). The commercial sector is the leading contributor towards the RAP, accounting for 49% of the total. The residential sector accounts for 38% and the industrial sector accounts for the remaining 13%.

FIGURE 1-1 20-YEAR CUMULATIVE ANNUAL ELECTRIC ENERGY EFFICIENCY POTENTIAL – ALL SECTORS

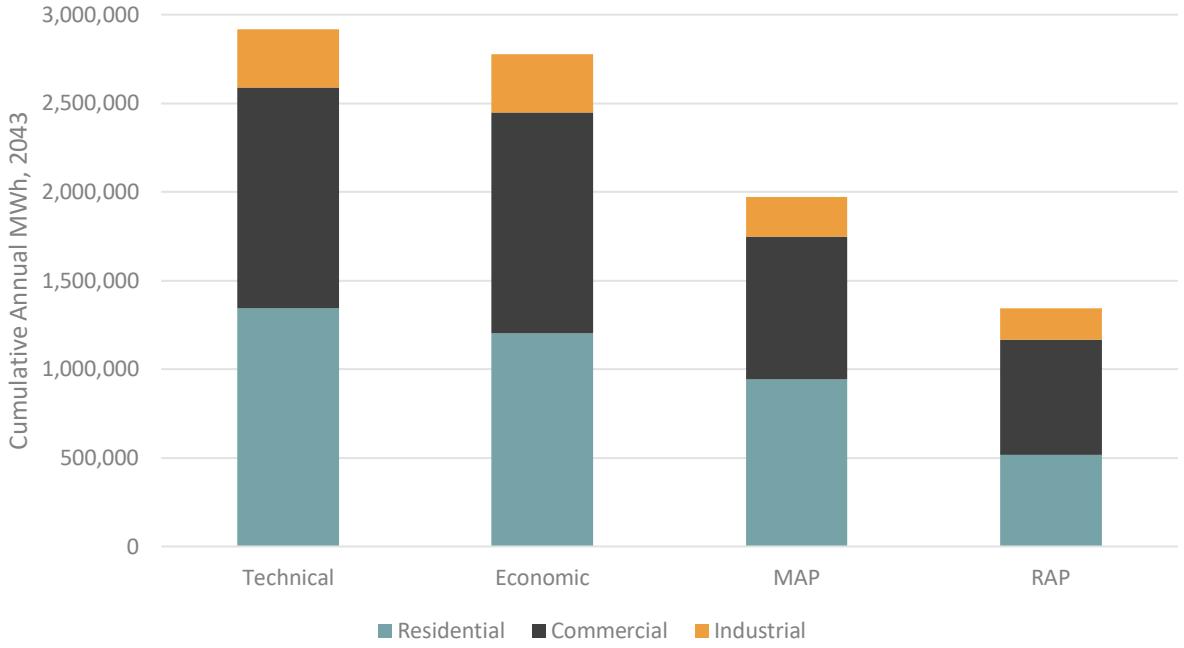


Table 1-3 provides the incremental annual RAP by sector for the first three years of the study as well as the 10th and 20th years. The incremental annual savings potential ranges from 1.6% to 2.4% of forecasted sales across the study timeframe.

TABLE 1-3 INCREMENTAL ELECTRIC MEASURE LEVEL RAP – BY SECTOR

Incremental Annual MWh	2024	2025	2026	2033	2043
Sector					
Residential	45,035	51,792	58,414	89,991	105,874
Commercial	63,584	60,267	57,190	63,747	77,411
Industrial	16,784	16,989	17,226	20,897	22,347
Total	125,403	129,047	132,830	174,635	205,631
Forecasted Sales	7,853,522	7,874,459	7,912,744	8,202,133	8,530,096
Incremental Annual Savings %					
Sector					
Residential	1.4%	1.6%	1.8%	2.7%	3.1%
Commercial	2.0%	1.9%	1.8%	1.9%	2.2%
Industrial	1.1%	1.1%	1.1%	1.4%	1.5%
% of Forecasted Sales	1.6%	1.6%	1.7%	2.1%	2.4%

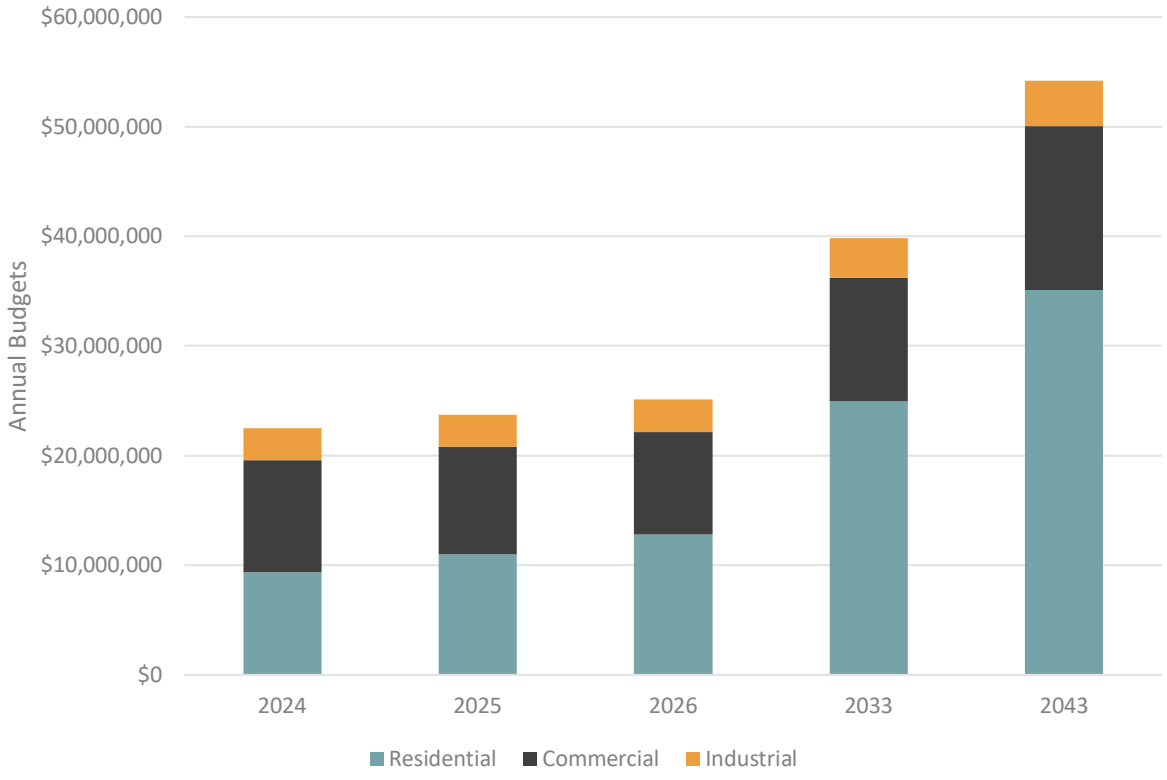
Table 1-4 provides the cumulative annual RAP by sector for the first three years of the study as well as the 10th and 20th years. The cumulative annual savings potential increases from 1.6% to 15.8% of forecasted sales across the study timeframe.

TABLE 1-4 CUMULATIVE ELECTRIC MEASURE LEVEL RAP – BY SECTOR

Cumulative Annual MWh	2024	2025	2026	2033	2043
Sector					
Residential	45,035	72,106	101,220	305,906	515,223
Commercial	63,584	123,635	180,526	480,756	652,252
Industrial	16,784	32,123	47,388	139,157	176,508
Total	125,403	227,865	329,133	925,818	1,343,983
Forecasted Sales	7,853,522	7,874,459	7,912,744	8,202,133	8,530,096
Cumulative Annual Savings %					
Sector					
Residential	1.4%	2.2%	3.1%	9.1%	14.9%
Commercial	2.0%	3.9%	5.7%	14.4%	18.3%
Industrial	1.1%	2.1%	3.1%	9.2%	11.7%
% of Forecasted Sales	1.6%	2.9%	4.2%	11.3%	15.8%

Figure 1-2 provides the annual budgets in the RAP scenario for the first three years of the study as well as the 10th and 20th years. The total RAP budgets across all sectors ranges from $22.5 million to $54.2 million during the study timeframe.

FIGURE 1-2 ANNUAL ELECTRIC ENERGY EFFICIENCY BUDGETS – ALL SECTORS



1.3.4 Gas Energy Efficiency

Table 1-5 summarizes natural gas energy efficiency savings. The table provides cumulative annual technical, economic, MAP and RAP potential energy savings, in total MMBtu and as a percentage of the sector-level sales forecast for the first three years of the analysis, as well as in the 10th and 20th year of the analysis. Over the study timeframe the cumulative technical potential rises to 38.9%. The cumulative RAP over the same timeframe reaches 13.0%.

TABLE 1-5 CUMULATIVE ANNUAL NATURAL GAS ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MMBtu					
Technical	4,257,223	8,067,528	11,613,025	31,725,853	48,624,822
Economic	3,364,009	6,477,227	9,549,635	28,161,596	44,822,128
MAP	891,667	1,845,458	2,974,965	15,280,240	30,995,269
RAP	652,161	1,252,232	1,905,186	7,816,316	16,182,406
Forecasted Sales	112,817,808	113,467,591	114,149,747	118,607,947	124,865,682
Energy Savings (as % of Forecast)					
Technical	3.8%	7.1%	10.2%	26.7%	38.9%
Economic	3.0%	5.7%	8.4%	23.7%	35.9%
MAP	0.8%	1.6%	2.6%	12.9%	24.8%
RAP	0.6%	1.1%	1.7%	6.6%	13.0%

Figure 1-3 provides the natural gas technical, economic, and achievable potential, by sector, by the end of the 20-year timeframe for the study (2024-2043). The residential sector is the leading contributor towards the RAP, accounting for 66% of the total. The commercial sector accounts for 31% and the industrial sector accounts for the remaining 3%.

FIGURE 1-3 20-YEAR CUMULATIVE ANNUAL NATURAL GAS ENERGY EFFICIENCY POTENTIAL – ALL SECTORS

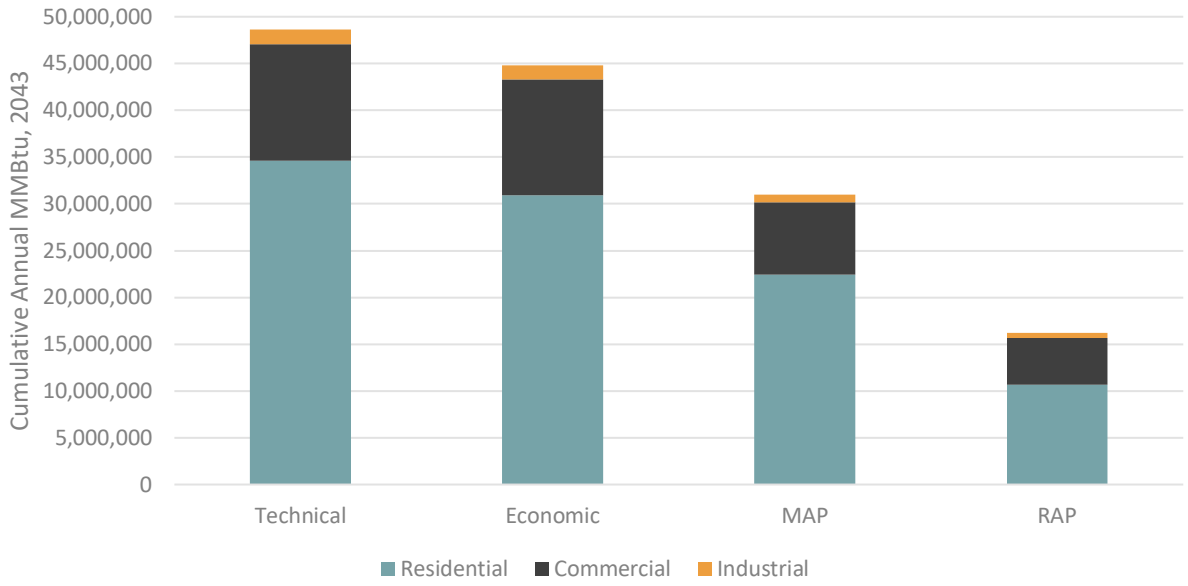


Table 1-6 provides the incremental annual RAP by sector for the first three years of the study as well as the 10th and 20th years. The incremental annual savings potential ranges from 0.6% to 1.3% of forecasted sales across the study timeframe.

TABLE 1-6 INCREMENTAL NATRUAL GAS MEASURE LEVEL RAP – BY SECTOR

Incremental Annual MMBtu	2024	2025	2026	2033	2043
Sector					
Residential	504,143	549,460	594,984	879,919	1,048,630
Commercial	137,588	161,145	186,289	380,235	557,903
Industrial	10,429	11,886	13,700	35,420	53,634
Total	652,161	722,490	794,973	1,295,574	1,660,167
Forecasted Sales	112,817,808	113,467,591	114,149,747	118,607,947	124,865,682
Incremental Annual Savings %					
Sector					
Residential	0.8%	0.8%	0.9%	1.3%	1.4%
Commercial	0.4%	0.4%	0.5%	1.0%	1.4%
Industrial	0.1%	0.1%	0.1%	0.4%	0.6%
% of Forecasted Sales	0.6%	0.6%	0.7%	1.1%	1.3%

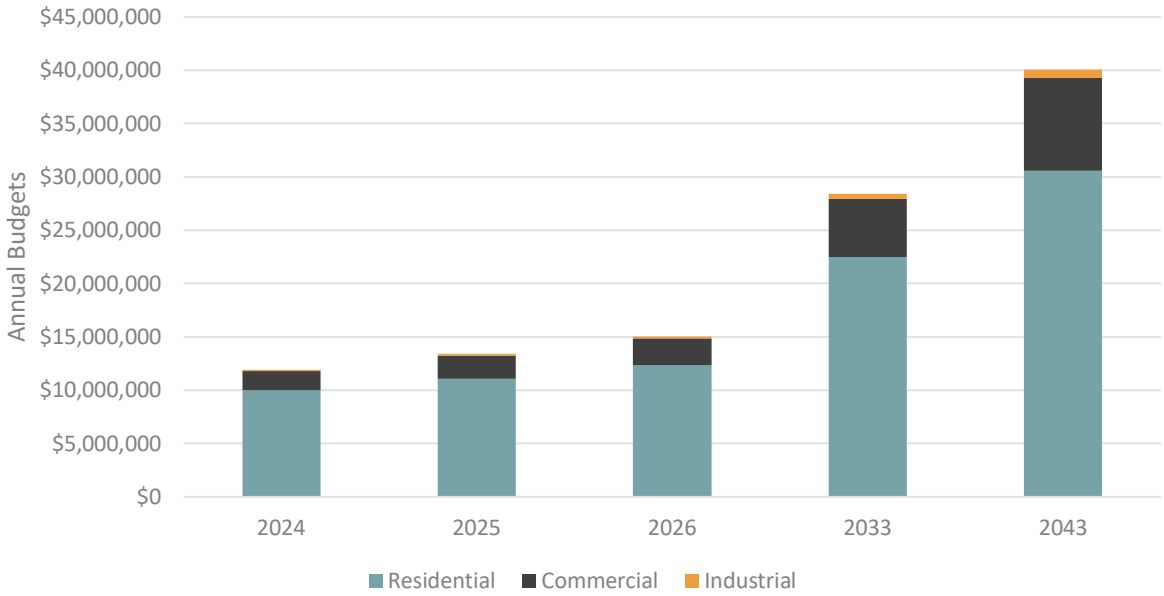
Table 1-7 provides the cumulative annual RAP by sector for the first three years of the study as well as the 10th and 20th years. The cumulative annual savings potential increases from 0.6% to 13.0% of forecasted sales across the study timeframe.

TABLE 1-7 CUMULATIVE NATURAL GAS MEASURE LEVEL RAP – BY SECTOR

Cumulative Annual MMBtu	2024	2025	2026	2033	2043
Sector					
Residential	504,143	931,185	1,384,150	5,347,188	10,683,771
Commercial	137,588	298,733	485,021	2,262,714	4,946,335
Industrial	10,429	22,315	36,015	206,414	552,301
Total	652,161	1,252,232	1,905,186	7,816,316	16,182,406
Forecasted Sales	112,817,808	113,467,591	114,149,747	118,607,947	124,865,682
Cumulative Annual Savings %					
Sector					
Residential	0.8%	1.4%	2.1%	7.6%	14.3%
Commercial	0.4%	0.8%	1.3%	5.8%	12.3%
Industrial	0.1%	0.2%	0.4%	2.1%	5.7%
% of Forecasted Sales	0.6%	1.1%	1.7%	6.6%	13.0%

Figure 1-4 provides the annual budgets in the RAP scenario for the first three years of the study as well as the 10th and 20th years. The total RAP budgets across all sectors ranges from $11.9 million to $40.1 million during the study timeframe.

FIGURE 1-4 ANNUAL NATRUAL GAS ENERGY EFFICIENCY BUDGETS – ALL SECTORS



1.4 DEMAND RESPONSE

This section provides an overview of the approach and key considerations used to assess demand response potential as well as the demand response potential results.

1.4.1 Approach Summary

The demand response potential study provides estimates of the MAP and RAP for demand response offerings. In the residential sector, the study assessed the following demand response offerings: a residential smart thermostat program, a water heater direct load control program, and a residential dynamic rates (critical peak pricing) program. For the commercial and industrial (C&I) sector, the considered programs included a small C&I dynamic rates (critical peak pricing) program and a medium and large C&I load curtailment program.

1.4.2 Historical Demand Response Programs and Rate 831

Prior to NIPSCO's rate case in 2018, NIPSCO's demand response portfolio was comprised of load curtailment agreements from a small number of large industrial customers.[2] NIPSCO was responsible for procuring capacity to meet the full peak loads of these customers, but also offered a substantial portion of these loads to MISO as LMRs, in order to help satisfy capacity requirements. As a result of the 2018 rate case, NIPSCO must now procure only enough resources for a portion of these customers' loads (known as "firm" loads, approximately 170 MW in total). However, NIPSCO can no longer claim the remaining "non-

[2] NIPSCO also previously offered a switch-based air conditioning direct load control program for the residential sector, but this was discontinued in 2015.

firm" portion of these customers' loads – nearly 700 MW – as demand response. A new rate class, Rate 831, was created for these customers to reflect the new arrangement.

Thus, while NIPSCO now has a lower total load obligation than before the 2018 rate case, it also cannot claim any demand response from Rate 831 companies. The change to NIPSCO's demand response portfolio is important to keep in mind when making comparisons to NIPSCO's historical demand response offerings and prior potential studies. When these large industrial loads are not considered, the quantity of demand response as a percentage of the peak load forecast for the MAP and RAP scenarios are approximately 7% and 3% in 2043, respectively. However, when the full loads and demand response capabilities of Rate 831 customers are included in the peak load forecast and as demand response, the total quantity of demand response in NIPSCO's territory increases to nearly 30% of the peak load.

1.4.3 Results

Table 1-8 shows the MAP program for select years within the study horizon. The 20-year MAP totals 136 MW. Table 1-9 shows the RAP program for select years within the study horizon. The 20-year RAP totals 57 MW. For both MAP and RAP, the Residential Smart Thermostat and the Residential Dynamic Rates programs were cost-effective while the Water Heater Direct Load Control program did not pass the cost-effectiveness test, resulting in no demand response capacity. In the non-residential sector, the Large C&I Load Curtailment program comprises the majority of demand response capacity in both the MAP and the RAP scenarios, followed by the Medium C&I Load Curtailment and Small C&I Dynamic Rates programs.

TABLE 1-8. MAXIMUM ACHIEVABLE POTENTIAL BY PROGRAM (CUMULATIVE BY YEAR)

Program	MAP				
	2024	2025	2026	2033	2043
Residential Smart Thermostat	7	8	9	19	37
Water Heater Direct Load Control	0	0	0	0	0
Residential Dynamic Rates (CPP)	0	0	0	24	24
Small C&I Dynamic Rates (Critical Peak Pricing)	0	0	0	12	13
Medium C&I Load Curtailment	3	4	6	7	7
Large C&I Load Curtailment	23	35	46	55	55
Total	**33**	**47**	**61**	**117**	**136**

TABLE 1-9. REALISTIC ACHIEVABLE POTENTIAL BY PROGRAM (CUMULATIVE BY YEAR)

Program	RAP				
	2024	2025	2026	2033	2043
Residential Smart Thermostat	4	4	4	5	8
Water Heater Direct Load Control	0	0	0	0	0
Residential Dynamic Rates (CPP)	0	0	0	10	11
Small C&I Dynamic Rates (Critical Peak Pricing)	0	0	0	5	5
Medium C&I Load Curtailment	2	2	3	4	4
Large C&I Load Curtailment	12	19	25	29	29
Total	**18**	**25**	**32**	**53**	**57**

1.5 OVERVIEW OF VOLUMES

In addition to this Executive Summary, the GDS Team prepared volumes for each of the separate studies. These volumes are listed below.

Volume I Electric Energy Efficiency Potential This study developed estimates of electric energy efficiency achievable potential savings opportunities.

Volume II Gas Energy Efficiency Potential This study developed estimates of natural gas energy efficiency achievable potential savings opportunities.

Volume III Demand Response Potential This study developed estimates of demand response achievable potential savings opportunities.

Volume IV Appendices list detailed measure level assumptions and select outputs associated with the electric and natural gas energy efficiency potential studies by customer segment.

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VOLUME I ELECTRIC ENERGY EFFICIENCY POTENTIAL

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1 Introduction

1.1 BACKGROUND & STUDY SCOPE

This Market Potential Study ("MPS") was conducted to support the Integrated Resource Plan (IRP) and DSM planning for NIPSCO. The study included primary market research and a comprehensive review of current programs, historical savings, and projected energy savings opportunities to develop estimates of technical, economic, and achievable potential. This report discusses the analysis and results for the electric energy efficiency potential analysis. Estimates of gas energy efficiency and demand response potential were developed and are included in separate volumes. The effort was highly collaborative, as the GDS Team worked closely alongside the NIPSCO Oversight Board (OSB) to produce reliable estimates of future savings potential, using the best available information and best practices for developing market potential savings estimates.

1.2 TYPES OF POTENTIAL ESTIMATED

The scope of this study distinguishes three types of energy efficiency potential: (1) technical, (2) economic, and (3) achievable.

- ***Technical Potential*** is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is constrained only by factors such as technical feasibility and applicability of measures.
- ***Economic Potential*** refers to the subset of the technical potential that is economically cost-effective as compared to conventional supply-side energy resources. Economic potential follows the same adoption rates as technical potential. Like technical potential, the economic scenario ignores market barriers to ensuring actual implementation of efficiency. Finally, economic potential only considers the costs of efficiency measures themselves, ignoring any programmatic costs (e.g., marketing, analysis, administration) that would be necessary to capture them. This study uses the Utility Cost Test (UCT) to assess cost-effectiveness.
- ***Achievable Potential*** is the amount of energy that can realistically be saved given various market barriers. Achievable potential considers real-world barriers to encouraging end users to adopt efficiency measures; the non-measure costs of delivering programs (for administration, marketing, analysis, and EM&V); and the capability of programs and administrators to boost program activity over time. Barriers include financial constraints, customer awareness and willingness to participate in programs, technical constraints, and other barriers the "program intervention" is modeled to overcome. The potential study evaluated two achievable potential scenarios:
- ***Maximum Achievable Potential (MAP)*** estimates achievable potential with NIPSCO paying incentives equal to 100% of measure incremental costs, while assuming strong adoption rates from aggressive customer education and program marketing.
- ***Realistic Achievable Potential (RAP)*** estimates achievable potential with NIPSCO paying incentive levels (as a percent of incremental measure costs) closely calibrated to current levels, but is not constrained by any previously determined spending levels.[1]

[1] An assessment of potential assuming current incentive levels provides a clear understanding of the remaining potential under present day conditions. NIPSCO's incentives are typically set to ensure cost-effectiveness under the Utility Cost Test. As part of ongoing EM&V efforts, NIPSCO monitors participant satisfaction and the influence of incentives on participation.

1.3 STUDY LIMITATIONS

As with any assessment of energy efficiency potential, this study necessarily builds on various assumptions and data sources, including the following:

- Energy efficiency measure lives, savings, and costs
- Projected penetration rates for energy efficiency measures
- Projections of electric avoided costs
- Future known changes to codes and standards
- NIPSCO load forecasts and assumptions on their disaggregation by sector, segment, and end use
- End-use saturations and fuel shares

While the GDS team has sought to use the best and most current available data (including the use of new primary market research in key market subsegments of interest based on stakeholder feedback) there are often reasonable alternative assumptions which would yield slightly different results. For instance, the analysis assumes that many existing measures, regardless of their current efficiency levels, can be eligible for future installation and savings opportunities. Other studies may select a narrower viewpoint, limiting the amount of potential from equipment that is already considered to be energy efficient. Additionally, the models used in this analysis must make several assumptions regarding program delivery and the timing of equipment replacement, which may ultimately occur more rapidly (or more slowly) than currently forecasted.

Furthermore, while the lists of energy efficiency measures examined in this analysis represent technologies available on the market today, as well as several emerging technologies not currently offered by NIPSCO, these measure lists may not be exhaustive. The GDS team acknowledges that new efficient technologies may become available, particularly over the course of a 20-year timeframe, which could produce efficiency gains and costs at different levels than those currently assumed.

Last, where possible, the GDS Team and NIPSCO collaborated to ensure consistency with assumptions and methodological considerations that are expected to be employed during the program planning process. However, final program designs and implementation strategies may need additional flexibility to target specific or underserved markets, address equity concerns, or react to changing customer preferences.

1.4 ORGANIZATION OF REPORT

The remainder of this volume is organized in seven sections as follows:

Section 2 MPS-Related Market Research details the primary market research studies completed in conjunction with the market potential analysis.
Section 3 MPS Methodology details the methodology used to develop the estimates of technical, economic, and achievable energy efficiency potential savings.
Section 4 MPS Market Characterization provides an overview of the NIPSCO service areas and a brief discussion of the forecasted energy sales by sector.
Section 5 Residential Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the residential sector.
Section 6 Commercial and Industrial Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the commercial and industrial (C&I) sectors.

Appendices for the DSM Market Potential Study are included in Volume IV of this report. The appendices list detailed measure level assumptions and select outputs by customer segment.

2 MPS-Related Market Research

The initial step in the assessment of future potential is to develop a clear understanding of the current market segments, as well as a clear understanding of the market research data available in the NIPSCO service territory. In late 2019 and early 2020, Skill Demand Energy was retained by GDS to conduct the primary market research that would inform critical elements of the MPS. The research objectives were developed in coordination with NIPSCO and the potential study team. Primary market research activities were focused on collecting updated equipment penetration, saturation, and efficiency characteristics; and customer willingness to participate (WTP) in program offerings across select end-uses/measures.

The resulting data was used to develop updated estimates of baseline and efficient equipment saturation estimates in the market potential study and also to develop expected long-term adoption rates for energy efficiency over the study horizon. The following section provides an overview of the market research plan and major deliverables of primary importance to the assessment of energy efficiency potential.

2.1 PRIMARY DATA COLLECTION ACTIVITIES

The following subsections provide an overview of the primary data collection activities conducted by Skill Demand Energy and GDS to support the market potential analysis of energy efficiency. GDS conducted survey research in the residential and commercial sectors. Due to the significant amount of industrial opt-out customers, GDS and NIPSCO did not focus research on the industrial sector.

2.1.1 Residential Online/Mail-In Survey Sample

The residential customer research targeted homeowners and tenants occupying single family (SF) and multifamily (MF) homes where NIPSCO supplies electricity only, gas only, or both. A residential online customer survey, conducted by GDS, collected home characteristics and equipment penetration for key end-uses such as heating, cooling, water heating, electronics, thermostats, and major appliances. Surveys were either mailed in or completed online. GDS oversampled in the multifamily sector to get a larger overall sample of customers and applied weighting factors (discussed in 2.1.4) to account for observed differences between the sample and overall population. GDS targeted 250 completed online/mail-in surveys and received a total of 336 completes. Table 2-1 shows the results of the online/mail-in survey by housing type and NIPSCO customer type.

TABLE 2-1 COMPLETED RESIDENTIAL SECTOR ONLINE/MAIL-IN SURVEYS

Residential Online/Mail-In Survey	SF	MF	Total Completed
Electric Only	9	29	38
Gas Only	66	13	79
Electric & Gas Customer	117	102	219
Total	192	144	336

2.1.2 Residential On-Site Survey Sample

The residential on-site visits collected detailed information on building characteristics as well as the penetration, saturation, and detailed characteristics of key energy using equipment (including the specific type of heating, cooling, and water heating equipment; lighting; insulation; major appliances; electronics; insulation; pool pumps; and windows and doors). Additionally, information on barriers to energy efficiency and willingness-to-adopt a range of energy efficient measures at varying incentive levels was collected.

GDS developed the sample of on-site visits from the respondents to the residential online/mail-in survey (a nested sampling approach) and Skill Demand Energy completed the on-site surveys. The target number of completed on-site visits was 68. Skill Demand Energy almost reached the target, with 65 visits of residential customers.

TABLE 2-2 TARGETED AND COMPLETED RESIDENTIAL SECTOR ON-SITE SURVEYS

Residential On-Site Survey	SF	MF	Total Completed
Electric Only	2	5	7
Gas Only	15	2	17
Electric & Gas Customer	30	11	41
Total	47	18	65

2.1.3 Commercial On-Site Survey Sample

Primary data collection in the business sector included on-site surveys of business customers. The survey collected business and facility characteristics, as well as equipment penetrations and saturations for key end-uses, such as lighting, heating, cooling, water heating, building envelope, and refrigeration. The business on-site survey also collected information on barriers to energy efficiency and willingness-to-adopt energy efficient measures under various incentive offerings. The target number of completed on-site visits was 68 and Skill Demand Energy reached that target.

TABLE 2-3 TARGETED AND COMPLETED COMMERCIAL SECTOR ON-SITE SURVEYS

Commercial On-Site Survey	Total Completed
Electric Only	19
Gas Only	22
Electric & Gas Customer	27
Total	68

2.1.4 Sample Weights

The data acquired through online/mail-in and on-site surveys was used to determine several penetrations and saturations used in the potential study. Before this data could be used, however, weighting factors needed to be applied to account for observed differences between the completed sample and the population.

To determine the weighting factors, population percentages, derived from the complete residential and nonresidential databases for electric, gas, and combination customers, were compared to the number of surveys completed in the market research sample. Weighting factors were applied to “electric only” and “combination” customers for relevant electric penetration/saturation data. Additional weighting factors were applied to “gas only” and “combination” customers for relevant gas penetration/saturation data.

Table 2-4 provides the weighting factors used for the residential online, residential onsite, and commercial on-site survey results.

TABLE 2-4 WEIGHTING FACTORS FOR PENETRATION/SATURATION DATA BY SURVEY TYPE

	Weighting Factors	Res On-line		Res On-Site		Com On-Site
		SF	MF	SF	MF	
Electric Total	Electric Only Weighting Factor	1.5	1.4	1.7	1.0	0.55
	Combination Weighting Factor	1.0	0.9	1.0	1.0	1.32
Gas Total	Gas Only Weighting Factor	1.4	7.3	1.6	5.3	0.69
	Combination Weighting Factor	0.8	0.2	0.7	0.2	1.25

2.2 RESIDENTIAL MARKET DATA OVERVIEW

Table 2-5 provides summary data by market segment for major electric residential end-uses. These data points for electric HVAC and water heating equipment penetrations help quantify the energy efficiency improvement opportunities by market segment. In addition, the research also provided recent market conditions for remaining efficiency opportunities, for example: the percent of households with low-flow devices, heat pump water heaters, as well as good and/or better insulation levels. The source column provides whether the data was pulled from the online/mail-in survey versus the on-site survey. Since there were many more responses from the online/mail-in survey, it was given priority where GDS had penetration data from both surveys. Characteristics shown below are based on NIPSCO electric customers only.

TABLE 2-5 SELECT RESIDENTIAL MARKET RESEARCH RESULTS FOR MAJOR ELECTRIC END-USES

Electric		Penetration		
End Use	Equipment	SF	MF	Source
Heating	Electric Heating	8.8%	34.0%	Online & Mail-in Survey (336 responses)
Cooling	Central AC	89.6%	84.6%	Online & Mail-in Survey (336 responses)
	Room AC	25.9%	18.4%	Online & Mail-in Survey (336 responses)
Water Heating	Electric Water Heating	8.9%	26.5%	On-Site Survey (65 surveys)
	Low Flow Showerheads	16.4%	67.4%	On-Site Survey (65 surveys)
Other	Refrigerator (saturation)	132.8%	112.6%	On-Site Survey (65 surveys)
	Pool Pump	3.0%	0.0%	On-Site Survey (65 surveys)
	Insulation Quality (R-20 or better)	67.7%	100.0%	On-Site Survey (65 surveys)

Table 2-6 includes the specific breakout for electric customers with electric heating, by equipment type. These proportions are tied to the electric heating saturations of 8.8% for SF and 34.0% for MF, as shown in Table 2-5 above.

TABLE 2-6 RESIDENTIAL ELECTRIC HEATING MARKET RESEARCH RESULTS FOR NIPSCO ELECTRIC CUSTOMERS

End Use	Equipment	SF	MF	Source
Electric Heating	Electric Baseboard	0.0%	6.3%	Online & Mail-in Survey (336 responses)
	Electric Furnace	63.9%	52.2%	Online & Mail-in Survey (336 responses)
	Air Source Heat Pump	18.1%	8.2%	Online & Mail-in Survey (336 responses)
	Heat Provided by Central System in MF Building	0.0%	29.3%	Online & Mail-in Survey (336 responses)
	Don't Know	18.0%	4.0%	Online & Mail-in Survey (336 responses)

Table 2-7 provides summary data by market segment for major gas residential end-uses. Table 2-7 only contains data from customers that are NIPSCO gas customers.

TABLE 2-7 SELECT RESIDENTIAL MARKET RESEARCH RESULTS FOR MAJOR GAS END-USES

Gas		Penetration		
End Use	Equipment	SF	MF	Source
Heating	Gas Furnace Heating	89.7%	71.6%	Online & Mail-in Survey (336 responses)
	Gas Boiler Heating	4.4%	6.5%	Online & Mail-in Survey (336 responses)
	Heat Pump Heating	1.2%	0.9%	Online & Mail-in Survey (336 responses)
Water Heating	Gas Water Heating	88.3%	96.7%	On-Site Survey (65 surveys)

2.3 COMMERCIAL MARKET DATA OVERVIEW

Commercial sector market research was limited to 68 commercial facilities across the NIPSCO survey area. The market research was designed to provide high-level estimates of key electric and/or natural gas end-uses that could support broader regional estimates typically used in the C&I sector. Table 2-8 provides key electric penetration estimates for major electric end-uses. Table 2-9 provides natural gas estimates for major natural gas end-uses.

TABLE 2-8 SELECT COMMERCIAL MARKET RESEARCH RESULTS FOR MAJOR ELECTRIC END-USES

End Use	Equipment	Penetration	Source
Heating	Electric Heating	23.4%	On-Site Survey (68 surveys)
Cooling	Split System	76.1%	On-Site Survey (68 surveys)
	PTAC	3.8%	On-Site Survey (68 surveys)
	Heat Pump	3.5%	On-Site Survey (68 surveys)

End Use	Equipment	Penetration	Source
	Mini Split	2.9%	On-Site Survey (68 surveys)
	Window Unit	2.8%	On-Site Survey (68 surveys)
Water Heating	Electric Water Heating	54.9%	On-Site Survey (68 surveys)
Cooking	Electric Only	16.4%	On-Site Survey (68 surveys)

TABLE 2-9 SELECT COMMERCIAL MARKET RESEARCH RESULTS FOR MAJOR GAS END-USES

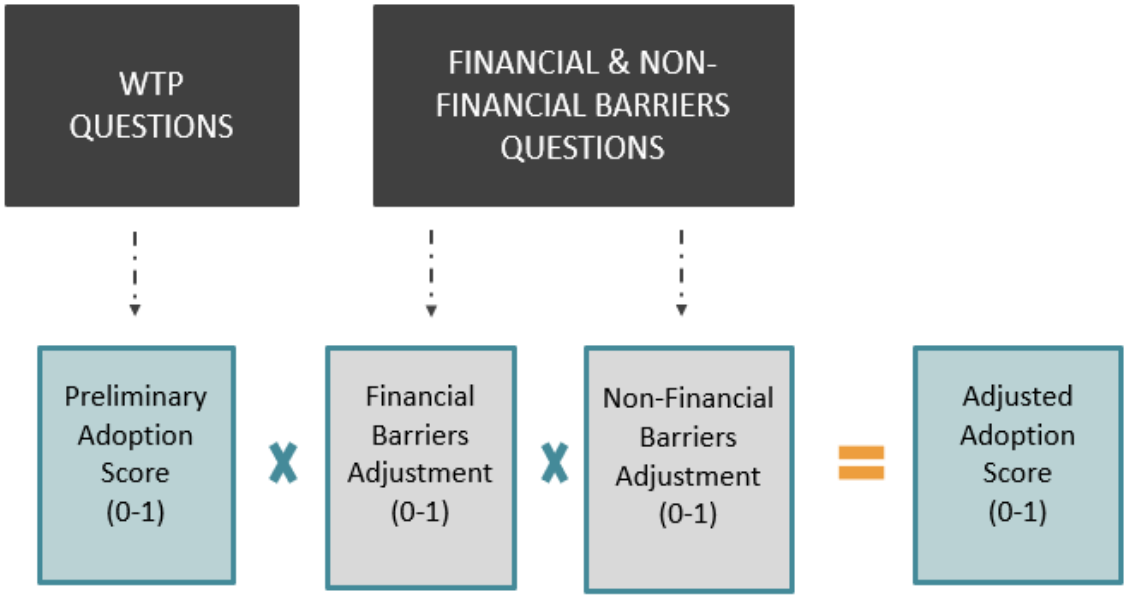
End Use	Equipment	Penetration	Source
Heating	Gas Heating	53.4%	On-Site Survey (68 surveys)
Water Heating	Gas Water Heating	16.5%	On-Site Survey (68 surveys)

2.4 WILLINGNESS TO PARTICIPATE (WTP) MARKET DATA

In addition to obtaining new primary research on building and energy-consuming equipment characteristics in the NIPSCO service area, one of the major objectives of the primary research was to survey NIPSCO customers on their future willingness to purchase and install energy efficiency technologies, in order to develop assumptions related to measure/program adoption curves and to help inform estimates of achievable potential.

Adoption rate calculations were based on a battery of questions which assessed (1) the respondent's willingness to adopt energy efficiency technologies or participate in demand response programs, in scenarios with varying levels of program support and (2) the magnitude of the respondent's financial and non-financial barriers to adoption/participation. Adoption rates were calculated based on Equation 2-1, shown below.

EQUATION 2-1 WILLINGNESS TO PARTICIPATE ADOPTION SCORE FORMULA



Direct willingness-to-participate questions are the starting point of measure/program-specific adoption curve calculations. For each item, respondents were asked to rate the likelihood that they would purchase the energy efficient version of the equipment, or participate in the DR program, at various incentive levels, including no incentive and an incentive that covers the full incremental (or total) cost. Responses to financial and non-financial barrier questions were then used to adjust the preliminary adoption score.

If "cost" was a consideration in preventing customers from purchasing energy efficient equipment, GDS assumed a financial barrier adjustment. The 0% incentive level was reduced by 100%, the 25% incentive level was reduced by 80%, the 50% incentive level was reduced by 60%, the 75% incentive level was reduced by 40%, and the 100% incentive level was reduced by 20%.[2]

If another reason, besides cost, was a consideration in preventing customers from purchasing energy efficient equipment, GDS assumed a non-financial barrier adjustment. The 0% incentive level was reduced by 50%, the 25% incentive level was reduced by 40%, the 50% incentive level was reduced by 30%, the 75% incentive level was reduced by 20%, and the 100% incentive level was reduced by 10%.

2.4.1 Residential Sector Final Adoption Scores

Table 2-10 presents the preliminary and final adoption scores (after financial and non-financial adjustments) based on responses by residential homeowners. As shown in the table, residential survey respondents were asked about their willingness to purchase and install energy efficient equipment across several incentive levels and for three types of equipment found in most homes: a general appliance (refrigerator), improved insulation, and an HVAC system.

TABLE 2-10 RESIDENTIAL LONG-TERM ADOPTION SCORES BY INCENTIVE LEVEL

End Use	0% Incentive	25% Incentive	50% Incentive	75% Incentive	100% Incentive
Before Awareness Adjustment					
Refrigeration	25.3%	43.2%	78.8%	78.8%	97.5%
Insulation	14.3%	48.3%	72.0%	72.0%	97.8%
HVAC	23.0%	57.3%	76.8%	76.8%	96.7%

2.4.2 Commercial Sector Final Adoption Scores

Table 2-11 presents the preliminary and final long-term adoption scores (after financial and non-financial adjustments) based on responses by commercial property managers. In contrast to the residential sector, commercial property managers were asked about their willingness to purchase and install energy efficient equipment according to different expected payback levels and two initial investment levels (major vs. minor).

TABLE 2-11 COMMERCIAL LONG-TERM ADOPTION SCORES BY INCENTIVE LEVEL

[2] The financial and non-financial barrier adjustment factors were both made on a stepwise scale because the barrier to choosing the efficient option is lessened as more of the incremental cost is covered. The adjustment for financial barriers is greater than for non-financial barriers because there is more of a contradiction between WTP and barrier responses. For example, it would be a contradiction if a respondent indicated that a financial barrier was a significant barrier to the adoption of the energy efficient option, but then also said they would adopt the energy efficient option without an incentive.

	10 Year Payback Period	5 Year Payback Period	3 Year Payback Period	1 Year Payback Period	0 Year Payback Period
Before Awareness Adjustment					
Major Investment	42.8%	58.1%	67.6%	74.6%	81.2%
Minor Investment	41.0%	56.1%	65.7%	73.1%	80.8%

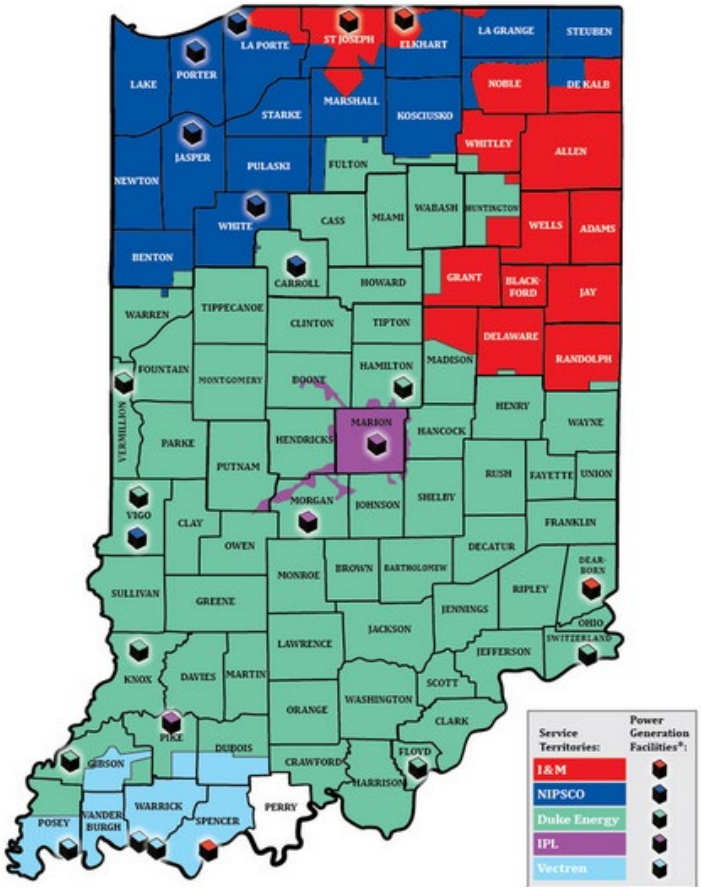
3 Sales Forecast and Market Segmentation

Developing a market characterization in the context of utility electric consumption among each sector is a key foundational element to market potential studies. A market characterization describes how energy is used among the various end-uses and building types that are the subject of the potential study. This section provides a brief overview of the sales and customer forecasts for NIPSCO's electric customers. It also includes a more detailed breakdown of end-use and building type consumption, along with an overview of how these segmentations were developed.

3.1 NIPSCO COMPANY SERVICE AREA

This study assessed the electric energy efficiency potential for NIPSCO. Figure 3-1 identifies the overall NIPSCO territory relative to the geographic area of Indiana.

FIGURE 3-1 NIPSCO SERVICE TERRITORY MAP

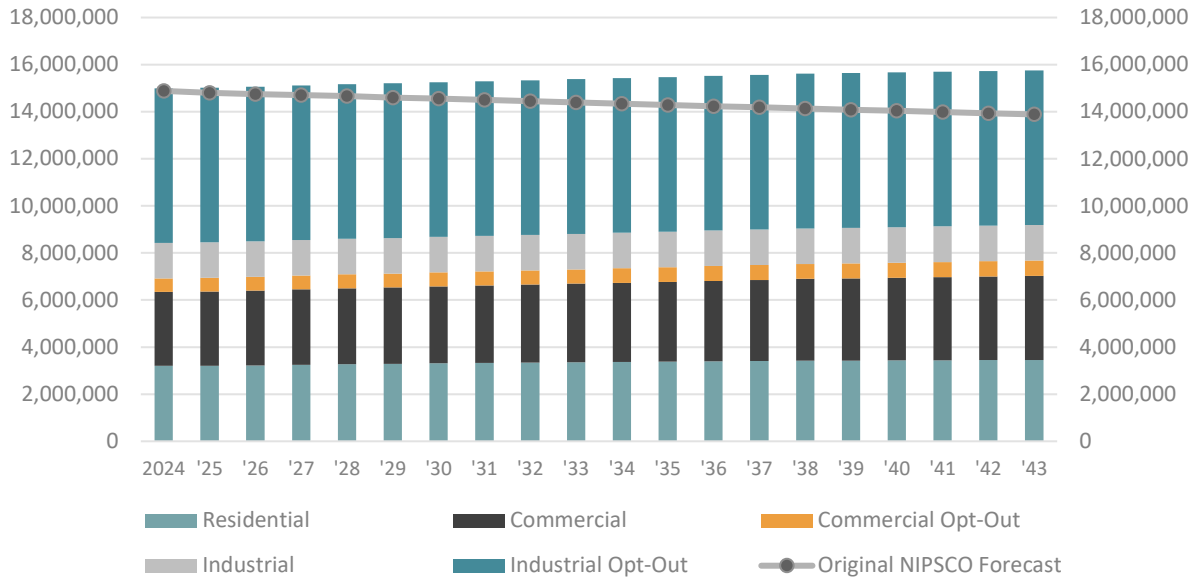


3.2 LOAD FORECASTS

Figure 3-2 provides the electric sales by sector used in the MPS across the 2024-2043 timeframe. Sales are forecasted to gradually increase from 15.0 million MWh to 15.75 million MWh from 2024 to 2043. The figure also shows a breakdown of sales projections for C&I opt-out customers.

This sales forecast, used in the MPS, was modified from the original sales forecast provided by NIPSCO to remove any future impacts of DSM programs. Based on discussions with NIPSCO staff, it was agreed that the original NIPSCO sales forecast included implied assumptions about future energy efficiency based on historical DSM performance. GDS coordinated with NIPSCO to add these impacts back into the MPS forecast, to avoid any potential over-counting of future energy efficiency potential in the NIPSCO service area. The original NIPSCO forecast is included in the figure below for illustrative purposes.

FIGURE 3-2 20-YEAR ELECTRIC SALES (MWH) FORECAST BY SECTOR

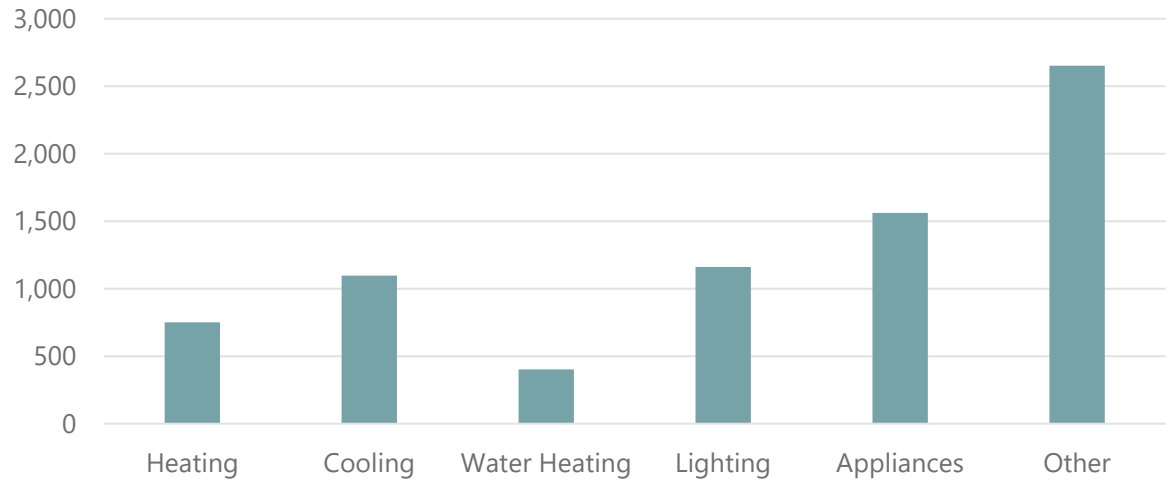


3.3 SECTOR LOAD DETAIL

3.3.1 Residential Sector

The residential electric calibration effort led to an end-use intensity breakdown as shown below in Figure 3-3. Overall, GDS estimated per home consumption to be 7,625 kWh per year. The "Other" end use is the leading end-use, reflecting the increasing prominence of electronics and other plug-in load devices.

FIGURE 3-3 RESIDENTIAL ELECTRIC END-USE BREAKDOWN



3.3.2 Commercial & Industrial Sectors

In the C&I sector, disaggregated forecast data provides the foundation for the development of energy efficiency potential estimates. As noted above, GDS received an initial forecast from NIPSCO and made modifications in coordination with NIPSCO and the NIPSCO OSB to remove any embedded energy efficiency impacts from the starting forecast. SIC information from NIPSCO, along with Energy Information Administration's Commercial Building Energy Consumption Survey (CBECS) building type consumption tables, was then used to segment the forecast into end-uses by building type. Figure 3-4 provides a breakdown of commercial electric sales by building type. Office (27%), Education (15%) and Retail (12%) are the leading contributors of the stand-alone building types to total commercial electric sales.

FIGURE 3-4 COMMERCIAL ELECTRIC SALES BREAKDOWN BY BUILDING TYPE

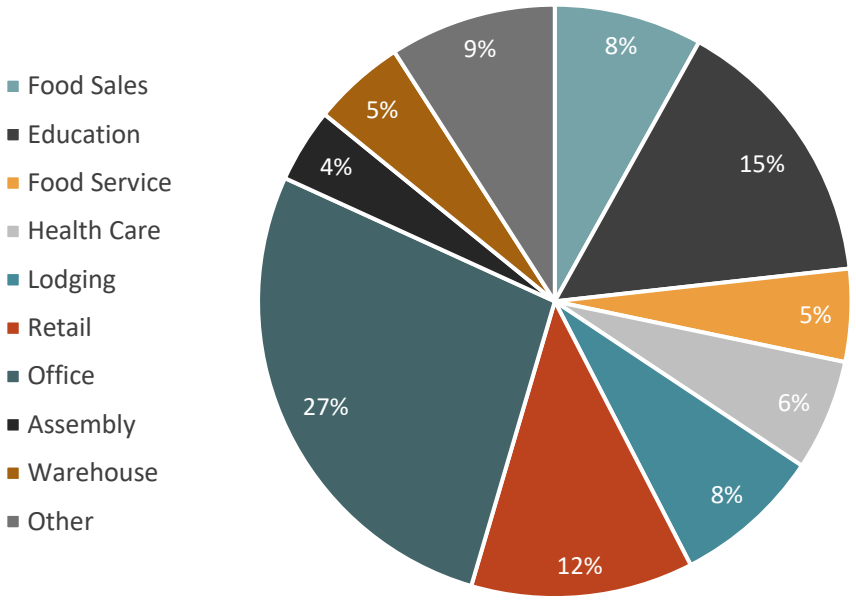


Figure 3-5 provides an illustration of the leading end-uses across all building types in the commercial sector. Lighting, space cooling, and ventilation are the primary end-uses with a significant share of load across most building types. Shares of refrigeration and office/computing are often dependent on the type of building, with refrigeration loads greatest in food sales and food service, while office/computing loads are greatest in offices and education.

FIGURE 3-5 COMMERCIAL ELECTRIC END-USE BREAKDOWN BY BUILDING TYPE

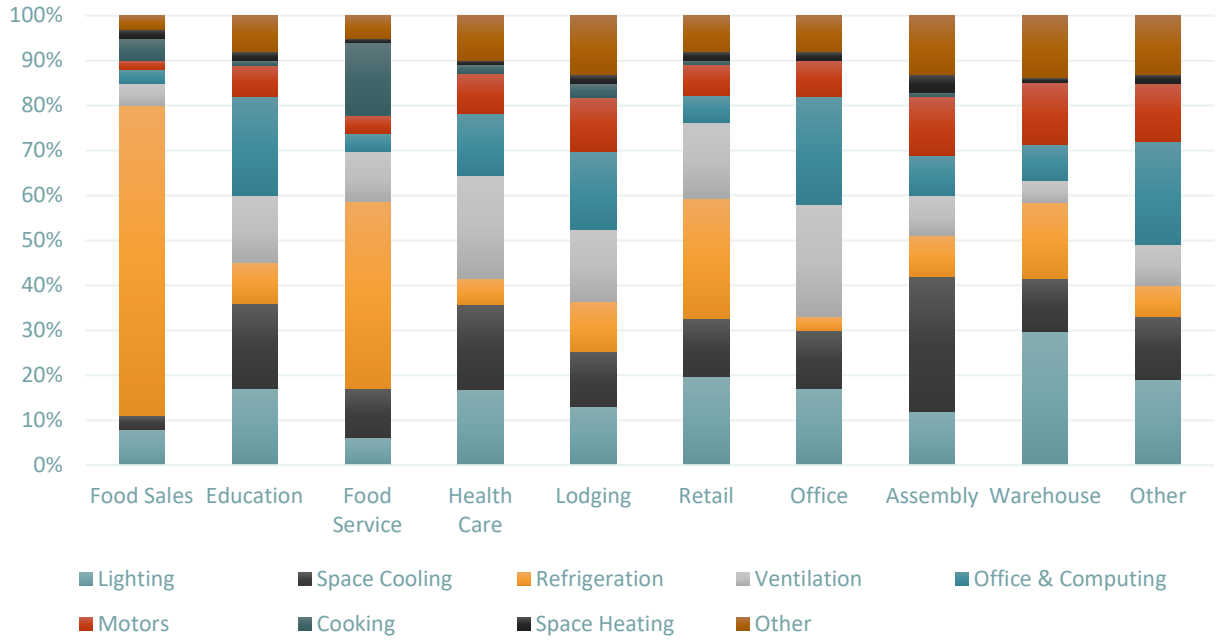
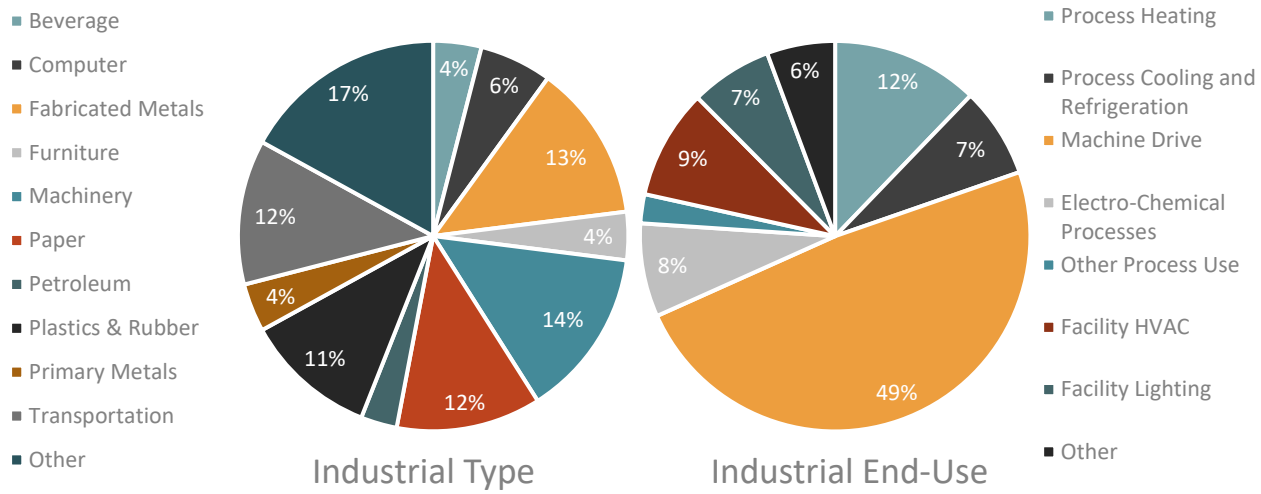


Figure 3-6 depicts the industrial segment, excluding current opt-out customers, broken down by both industry type (left pie chart) and end-use (right pie chart). Other/Miscellaneous, Machinery, Fabricated Metals, Paper, and Transportation were the leading industry types according to SIC code. Industrial Machine Drive is the dominant share of industrial sales, followed by Process Heating and Facility HVAC. The industry type and end-use breakdowns are based on the industrial sales that are net of opt-out customers in the NIPSCO service area.

FIGURE 3-6 INDUSTRIAL SECTOR SALES BREAKDOWN BY INDUSTRY TYPE AND END-USE (EXCLUDES OPT-OUT CUSTOMERS)[3]



[3] Missing values reflect industry type/end-uses with < 2% of total industrial sales.

4 Market Potential Study Methodology

This section describes the overall methodology utilized to assess the electric energy efficiency potential in the NIPSCO service area. The main objectives of this Market Potential Study ("MPS") were to estimate the technical, economic, maximum achievable potential ("MAP"), and realistic achievable potential ("RAP") savings from energy efficiency in the NIPSCO service territory; and to quantify these estimates of potential in terms of MWh and MW savings, for each level of energy efficiency potential.

4.1 OVERVIEW OF APPROACH

For the residential sector, GDS took a bottom-up approach to the modeling, whereby measure-level estimates of costs, savings, and useful lives were used as the basis for developing the technical, economic, and achievable potential estimates. The measure data was used to build-up the technical potential, by applying the data to each relevant market segment. Measure data was also used for benefit-cost screening to assess economic potential, which was in turn used as the basis for achievable potential. For the C&I sectors, GDS took a bottom-up modeling approach to first estimate measure-level savings and costs as well as cost-effectiveness, and then applied cost-effective measure savings to all applicable shares of energy load. Further details of the market research and modeling techniques utilized in this assessment are provided in the following sections.

4.2 MARKET CHARACTERIZATION

The initial step in the analysis was to gather a clear understanding of the current market segments in the NIPSCO service area. The GDS team coordinated with NIPSCO to gather utility sales, customer data, and existing market research, in order to define appropriate market sectors, market segments, vintages, saturation data and end uses. This information served as the basis for completing a forecast disaggregation and market characterization of both the residential and nonresidential sectors.

4.2.1 Forecast Disaggregation

As noted in Chapter 3, through the development of the baseline forecasts, GDS produced disaggregated forecasts by sector and end-use. The produced baseline forecasts were disaggregated by sector and then further segmented as follows:

- ***Residential.*** The residential forecast was broken out by housing type between existing income qualified and market-rate customers, as well as new construction.
- ***Commercial.*** Typically based on major EIA CBECS business types: retail, warehouse, food sales, office, lodging, health, food service, education, and miscellaneous.
- ***Industrial.*** As determined by actual load consumption shares and major industry types, defined by EIA's Manufacturing Energy Consumption Survey (MECS) data.

The segmentation analysis was performed by applying NIPSCO-specific segment and end-use consumption shares, derived from NISPCO's customer database and SIC code analysis (building segmentation), and by EIA CBECS and MECS data (end-use segmentation), to forecast year sales. Within the residential, commercial, and industrial market segments, the produced forecasts were segmented by the major end uses shown in Table 4-1.

TABLE 4-1: ELECTRIC END-USE LOADS

Residential	C&I	
	Commercial	Industrial
Heating	Interior Lighting	Interior Lighting
Cooling	Exterior Lighting	Exterior Lighting
Water Heating	Refrigeration	Space Cooling
Cooking	Space Cooling	Space Heating
Refrigerator	Space Heating	Ventilation
Freezer	Ventilation	Water Heating
Dishwasher	Water Heating	Process - Machine Drive
Clothes Washer	Office Equipment	Process - Industrial
Clothes Dryer	Cooking	Process - Process Cooling & Refrigeration
TV	Other	Process - Process Heating
Lighting	Behavioral	Process - Agriculture
Miscellaneous		Behavioral

4.2.2 Eligible Opt-Out Customers

In Indiana, commercial or industrial customers with a peak load greater than 1MW are eligible to opt out of utility-funded electric energy efficiency programs. In the NIPSCO service area, approximately 16% of commercial sales have opted out of utility-funded electric energy efficiency programs, while roughly 80% of industrial sales have opted out. [4]

FIGURE 4-1 OPT-OUT SALES BY C&I SECTOR (2024)

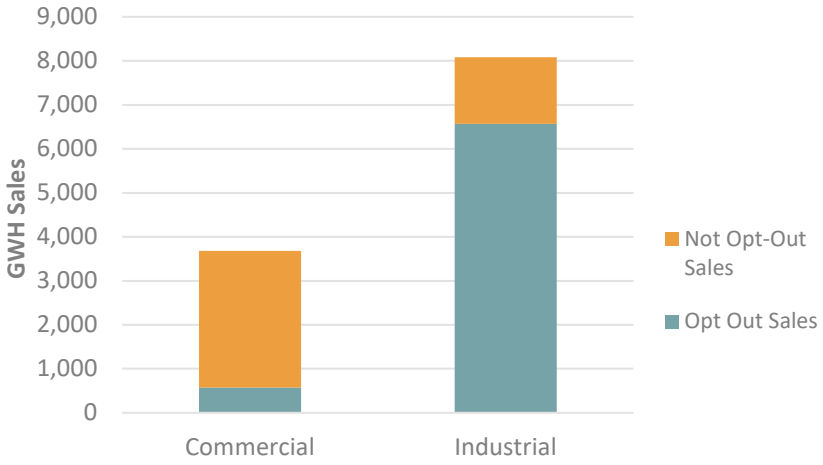


Figure 4-1 shows the total sales for the C&I sectors, as well as the sales, by sector, that have currently opted out of paying the charge levied to support utility-administered energy efficiency programs. The portion of sales that have not opted out include both ineligible load (i.e., does not meet the 1 MW monthly peak requirement) as well as eligible load that has not yet opted out.

The main body of this report focuses on the electric energy efficiency potential savings in the C&I sectors excluding sales from opt-out customers. Results of C&I sector potential in a scenario that includes savings from NIPSCO's opt-out customers are provided in Section 6.6.

4.2.3 Building Stock/Equipment Saturation

To assess the potential electric energy efficiency savings available, estimates of the current saturation of baseline equipment and energy efficiency measures are necessary.

4.2.3.1 Residential Sector

[4] These percentages were calculated based on 2017 NIPSCO non-residential customer data and 2017 billing history. Note, the total C&I sales were adjusted to shift select industrial sales into the commercial sector based on the identified building type and more applicable mapping to the commercial sector models for the MPS.

For the residential sector, GDS relied on several primary research efforts. The most important effort was a 2019 online/mail survey of NIPSCO customers conducted by the GDS Team as part of the study. The more than 200 responses received provided a strong basis for many of the NIPSCO measure baseline and efficient saturation estimates. GDS also relied on the onsite survey of NIPSCO customers conducted by the GDS Team in 2019. This study helped fill in data gaps and confirm the results of the online survey.

Other data sources included ENERGY STAR unit shipment data, NIPSCO evaluation reports, EIA Residential Energy Consumption Survey data from 2015 and baseline studies from other states. The ENERGY STAR unit shipment data filled data gaps related to the increased saturation of energy efficient equipment across the U.S. in the last decade.

4.2.3.2 C&I Sector

For the commercial sector, building stock and equipment saturation data was informed from a combination of primary market research (on-site surveys noted in Section 2.3), as well as other available regional or national data. The survey data helped inform the disaggregation of the end-use sales forecast further into measure groups consistent with the measures included in the potential analysis. For example, observed lighting types (tube fluorescent vs. screw-based, hi-bay vs. low-bay) and different HVAC types were used for this purpose.

Beyond the primary data collection, EIA regional data, as well as national studies on commercial energy consumption, were used to inform consumption in the remaining end-uses where data from the primary market research was even more limited.[5] These sources typically informed estimates of base equipment saturation for cooking, refrigeration, water heating, plug loads, and other miscellaneous end-uses.

GDS did not collect any primary market research in the industrial sector due to the high prevalence of eligible opt-out customers. GDS relied on secondary research, including the EIA Manufacturing Energy Consumption Survey, for assessing the efficiency saturation of the remaining measures for industrial lighting, process motors and variable frequency drives, space cooling equipment, and air compressors. Like the commercial sector, emerging technologies were assumed to have little to no significant market saturation.

4.2.4 Remaining Factor

The remaining factor is the proportion of a given market segment that is not yet efficient and can still be converted to an efficient alternative. It is the inverse of the saturation of an energy efficient measure, prior to any adjustments. For this study we made two key adjustments to recognize that the energy efficient saturation does not necessarily always fully represent the state of market transformation. In other words, while a percentage of installed measures may already be efficient, this does not preclude customers from backsliding, or reverting to standard technologies, or otherwise less efficient alternatives in the future, based on considerations like measure cost and availability and customer preferences (e.g., historically, some customers have disliked CFL light quality, and have reverted to incandescent and halogen bulbs after the CFLs burn out).

For measures categorized as market opportunity (i.e., replace-on-burnout), we assumed that 50% of the instances in which an efficient measure is already installed, the burnout or failure of those measures would be eligible for inclusion in the estimate of future savings potential. Essentially, this adjustment implies that we are assuming that 50% of the market is transformed, and no future savings potential exists,

[5] Examples of secondary research includes Energy Savings Potential RD&D Opportunities for Commercial Building Appliances (DOE 2016) and Energy Star Shipment Data.

whereas the remaining 50% of the market is not transformed and could backslide without the intervention of a NIPSCO program and an incentive. Similarly, for retrofit measures, we assumed that in only 10% of the instances in which an efficient measure is already installed, the burnout or failure of those measures would be eligible for inclusion in the estimate of future savings potential. This recognizes the more proactive nature of retrofit measures, as the implementation of these measures are more likely to be elective in nature, compared to market opportunity measures, which are more likely to be needs-based. We recognize the uncertainty in these assumptions, but we believe these are appropriate assumptions, as they recognize a key component of the nature of customer decision making.

There are, of course, exceptions to this logic. Select measures were considered one-time efficiency opportunities and are not eligible to be replaced/refilled in the analysis once the measures have been initially converted to efficient status. Examples of these measures include variable frequency drives, motor controls, comprehensive residential retrofits, and most shell measures (insulation, air sealing, and door improvements). Other exceptions included measures that are known to be impacted by codes or standards, measures considered to have reached the limit of technological advancements in efficiency (ex. Screw-based LED Lighting, where future efficiency improvements are expected to be minimal compared to historic baselines) and miscellaneous residential electronics with high market penetration.

4.3 MEASURE CHARACTERIZATION

4.3.1 Measure Lists

The study's sector-level energy efficiency measure lists were informed by a range of sources including the Indiana TRM, current NIPSCO program offerings, and commercially viable emerging technologies, among others. Measure list development was a collaborative effort in which GDS developed draft lists that were shared with NIPSCO and stakeholders. The final measure lists ultimately included in the study reflected the informed comments and considerations from the parties that participated in the measure list review process.

In total, GDS analyzed 454 measure types for NIPSCO. Many measures were included in the study as multiple permutations to account for different specific market segments, such as different building types, efficiency levels, and replacement options. GDS developed a total of 7,869 measure permutations for this study. Each permutation was screened for cost-effectiveness according to the UCT. The parameters for cost-effectiveness under the UCT are discussed in detail later in Section 4.4.3.

TABLE 4-2 NUMBER OF ELECTRIC MEASURES EVALUATED

	# of Measures	Total # of Measure Permutations
NIPSCO – Electric		
Residential	182	739
Commercial	169	5070
Industrial	103	2060
Total	***454***	***7869***

4.3.2 Emerging Technologies

GDS considered several specific emerging technologies as part of analyzing future potential. In the residential sector, these consist of several smart technologies, including smart appliances, smart water heater (WH) tank controls, smart window coverings, smart ceiling fans, heat pump dryers and home automation/home energy management systems. In the non-residential sector, specific emerging technologies that were considered as part of the analysis include strategic energy management, advance lighting controls, advanced rooftop controls, cloud-based energy information systems (EIS), high

performance elevators, and escalator motor controls. While this is likely not an exhaustive list of possible emerging technologies over the next twenty years, it does consider many of the known technologies that are available today but may not yet have widespread market acceptance and/or product availability.

In addition to these specific technologies, GDS acknowledges that there could be future opportunities for new technologies as equipment standards improve and market trends occur. While this analysis does not make any explicit assumption about unknown future technologies, the methodology assumes that subsequent equipment replacement that occurs over the course of the 20-year study timeframe, and at the end of the initial equipment's useful life, will continue to achieve similar levels of energy savings, relative to improved baselines, at similar incremental costs.

4.3.3 Assumptions & Sources

A significant amount of data is needed to estimate the electric savings potential for individual energy efficiency measures or programs across the residential and nonresidential customer sectors. GDS utilized data specific to NIPSCO, when it was available and current. GDS used the most recent NIPSCO evaluation report findings (as well as NIPSCO program planning documents), the 2015 Indiana Technical Reference Manual (TRM), the Illinois TRM, and the Michigan Energy Measures Database (MEMD) to inform a large amount of the data requirements. Evaluation report findings, NIPSCO program planning assumptions, and the Indiana TRM were leveraged to the extent feasible – additional data sources were only used if these sources either did not address a certain measure or contained outdated information. Building energy simulation modeling results formed the basis for most heating and cooling end use measure savings. The National Renewable Energy Laboratory (NREL) Energy Measures Database also served as a key data source in developing measure cost estimates. Additional source documents included American Council for an Energy-Efficient Economy (ACEEE) research reports, covering topics like emerging technologies.

Measure Savings: GDS relied on existing NIPSCO evaluation report findings and the 2015 IN TRM to inform calculations supporting estimates of annual measure savings as a percentage of base equipment usage. For custom measures and measures not included in the IN TRM, GDS estimated savings from a variety of sources, including:

- Illinois TRM, MEMD, and other regional/state TRMs
- Building energy simulation software (BEopt) and engineering analyses
- Secondary sources such as the ACEEE, Department of Energy (DOE), EIA, ENERGY STAR©, and other technical potential studies

Measure Costs: Measure costs represent either incremental or full costs. These costs typically include the incremental cost of measure installation, when appropriate, based on the measure definition. For purposes of this study, nominal measure costs held constant over time.[6]

GDS obtained measure cost estimates primarily from the NIPSCO program planning databases and the 2015 IN TRM. GDS used the following data sources to supplement the IN TRM:

- Illinois TRM, MEMD, and other regional/state TRMs
- Secondary sources, such as the ACEEE, ENERGY STAR, and NREL
- Program evaluation and market assessment reports completed for utilities in other states

[6] GDS had previously reviewed the deemed measure cost assumptions included in the Illinois TRM from 2012 (v1) through 2018 (v7). Where a direct comparison of cost was applicable, GDS found no change in measure cost across 80% of residential and nonresidential measures. In a similar search of the MEMD from 2011 to 2018, GDS again found that most of incremental measure costs in 2018 were either the same or higher than the recorded incremental measure cost in 2011.

Costs and savings for new construction and replace on burnout measures were calculated as the incremental difference between the code minimum equipment and the energy efficiency measure. This approach was utilized because the consumer must select an efficiency level that is at least the code minimum equipment when purchasing new equipment. The incremental cost is calculated as the difference between the cost of high efficiency and standard efficiency (code compliant) equipment. However, for retrofit or direct install measures, the measure cost was the "full" cost of the measure, as the baseline scenario assumes the consumer would not make energy efficiency improvements in the absence of a program. In general, the savings for retrofit measures are calculated as the difference between the energy use of the removed equipment and the energy use of the new high efficiency equipment (until the removed equipment would have reached the end of its useful life).

Measure Life: Measure life represents the number of years that energy using equipment is expected to operate. GDS obtained measure life estimates from the 2015 IN TRM and NIPSCO program planning databases, and used the following data sources for measures not in the IN TRM:

- Illinois TRM, MEMD, and other regional/state TRMs
- Manufacturer data
- Savings calculators and life-cycle cost analyses

All measure savings, costs, and useful life assumption sources are documented in the Appendices volume of this report.

4.3.4 Treatment of Codes & Standards

By law, the U.S. Department of Energy (DOE) is expected to review each national appliance standard every six years and publish either a proposed rule to update the standard or determine that no change to the existing standard is needed. As of March 2021, DOE has missed legal deadlines for twenty-eight product standards since 2016.[7] Given these delays in future standard updates, the initial start year of 2024 for this analysis, and that the analysis is not intended to predict how or when energy codes and standards will change over time, there are only limited known improvements to federal codes and standards to reasonably account for in this analysis.

The primary adjustment in this analysis impacts residential screw-based lighting. Although DOE did issue a final rule stating that the EISA backstop has not been triggered and adopted a narrow definition of general service lighting, based on discussion with NIPSCO program administrators, and the NIPSCO OSB, the base case analysis for the 2021 MPS severely limited the future potential for residential lighting throughout the analysis timeframe. The base case assumes only a limited number of direct-install screw-based lighting opportunities for standard, specialty, and reflector bulbs over the analysis period.

Although not exhaustive, other key adjustments include:

- The baseline efficiency for air source heat pumps (ASHP) is anticipated to improve to 15 SEER/8.8 HSPF[8] in 2023. As the new standards allow for a sell-through period, the baseline efficiency is assumed to be the new federal standard, beginning in 2024.
- The baseline efficiency for split system central AC systems is anticipated to improve to 14 SEER in 2023. As the new standards allow for a sell-through period, the baseline efficiency is assumed to be the new federal standard, beginning in 2024.

[7] Missed Deadlines for Appliance Standards. Prepared by the Appliance Standards Awareness Project. Updated March 2021.

[8] SEER: Seasonal Energy Efficiency Ratio; HSPF: Heating Seasonal Performance Factor.

- DOE established the first national standards for pool pumps in 2017, becoming effective in 2021. The new standards will cut energy use for in-ground pool pumps by approximately 70% and can be met by switching from single-speed to variable-speed pool pumps.
- In 2019, the DOE made new standards effective for residential, portable and whole-home dehumidifiers. The new standards are based on a new metric, integrated energy factor (IEF) which improves the test procedure to better reflect the actual energy consumption of dehumidifiers in the home. The new standards range from 1.30 L/kWh for small dehumidifiers up to 2.8 L/kWh for larger capacity dehumidifiers.
- In July 2019, the DOE made new standards effective for more efficient furnace fans/motors. The standards are expected to improve efficiency by approximately 45% over the current baselines. To date, many furnaces are equipped with standard induction motors, which operate at about 60-65% efficiency. The new standard will create a shift to electronically commutated motors (ECMs).
- DOE established new standards for pre-rinse spray valves, setting maximum flow rates between 1.0 and 1.28 gallons per minute. The new standards took effect in early 2019 and will be reflected in the analysis.

4.3.5 Net to Gross (NTG)

All estimates of technical, economic, and achievable potential, as well as measure level cost-effectiveness screening, were conducted in terms of gross savings to reflect the absence of program design considerations in these phases of the analysis. The impacts of free-riders (participants who would have installed the high efficiency option in the absence of the program) and spillover customers (participants who install efficiency measures due to program activities, but never receive a program incentive) were considered in the development of DSM inputs into NIPSCO's upcoming IRP.

4.4 ENERGY EFFICIENCY POTENTIAL

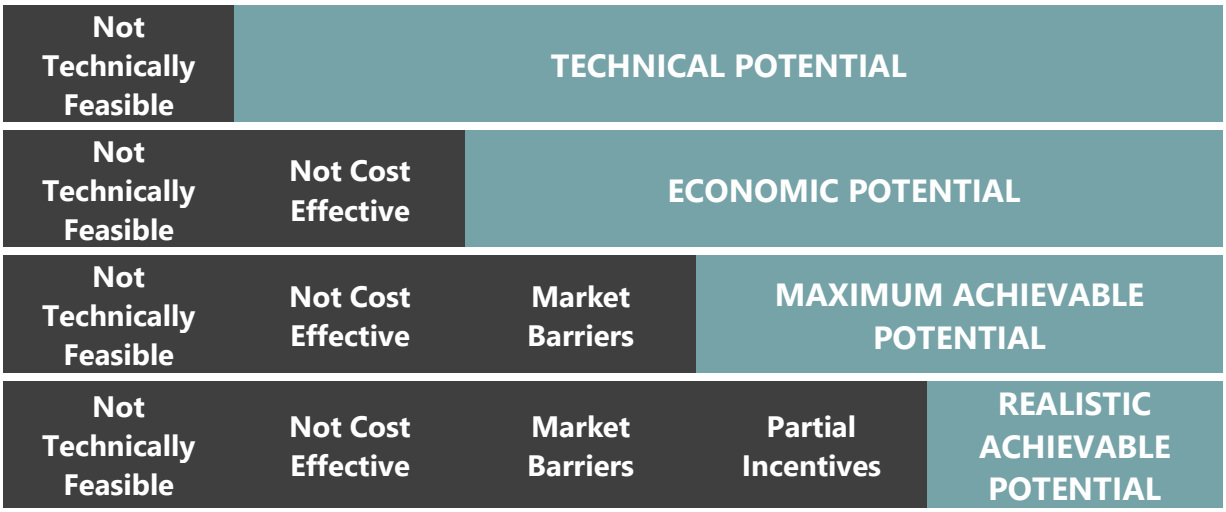
This section reviews the types of potential analyzed in this report, as well as some key methodological considerations in the development of technical, economic, and achievable potential.

4.4.1 Types of Potential

Potential studies often distinguish between several types of energy efficiency potential: technical, economic, and achievable. However, because there are often important definitional issues between studies, it is important to understand the definition and scope of each potential estimate as it applies to this analysis.

The first two types of potential, technical and economic, provide a theoretical upper bound for energy savings from energy efficiency measures. Still, even the best-designed portfolio of programs is unlikely to capture 100% of the technical or economic potential. Therefore, achievable potential attempts to estimate what savings may realistically be achieved through market interventions, when it can be captured, and how much it would cost to do so. Figure 3-2 illustrates the types of energy efficiency potential considered in this analysis.

FIGURE 3-2 TYPE OF ENERGY EFFICIENCY POTENTIAL

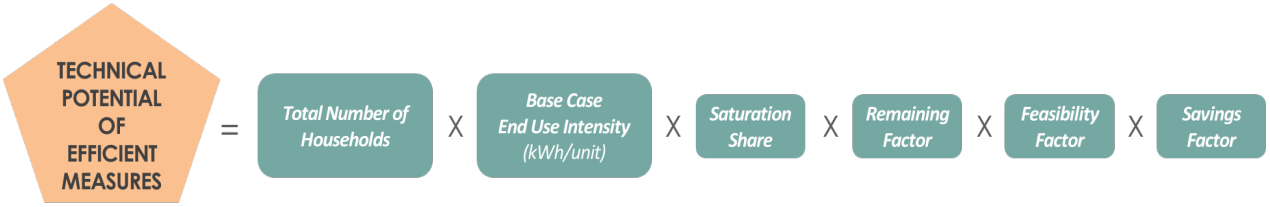


4.4.2 Technical Potential

Technical potential is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. Under technical potential, GDS assumed that 100% of new construction and market opportunity measures are adopted as those opportunities become available (e.g., as new buildings are constructed, they immediately adopt efficiency measures, or as existing measures reach the end of their useful life). For retrofit measures, implementation was assumed to be resource constrained and it was assumed that it was not possible to install all retrofit measures at once. Rather, retrofit opportunities were assumed to be replaced incrementally until 100% of stock was converted to the efficient measure, over a period of no more than 15 years.

The core equation used in the residential sector energy efficiency technical potential analysis for each individual efficiency measure is shown in Equation 4-1 below. The business (C&I) sector employs a similar analytical approach.

EQUATION 4-1 CORE EQUATION FOR RESIDENTIAL SECTOR TECHNICAL POTENTIAL



Where…

Base Case Equipment End-Use Intensity = the electricity used per customer per year by each base-case technology in each market segment. In other words, the base case equipment end-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.

Saturation Share = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential water heating, the saturation share would be the fraction of all residential electric customers that have electric water heating in their household.

Remaining Factor = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of electric water heaters that is not already energy efficient.

Feasibility Factor = (also functions as the applicability factor) the fraction of the applicable units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (e.g., it may not be possible to install heat pump water heaters in all homes because of space limitations).

Savings Factor = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

4.4.2.1 Competing Measures & Interactive Effects Adjustments

GDS prevents double-counting of savings, and accounts for competing measures and interactive savings effects, through three primary adjustment factors:

Baseline Saturation Adjustment. Competing measure shares may be factored into the baseline saturation estimates. For example, nearly all homes can receive insulation, but the analysis has created multiple measure permutations to account for varying impacts of different heating/cooling combinations and has applied baseline saturations to reflect proportions of households with each heating/cooling combination.

Applicability Factor Adjustment. Combined measures into measure groups, where total applicability factor across measures is set to 100%. For example, homes cannot receive a programmable thermostat, connected thermostat, and smart thermostat. In general, the models assign the measure with the most savings the greatest applicability factor in the measure group, with competing measures picking up any remaining share.

Interactive Savings Adjustment. As savings are introduced from select measures, the per-unit savings from other measures need to be adjusted (downward) to avoid over-counting. The analysis typically prioritizes market opportunity equipment measures (versus retrofit measures that can be installed at any time). For example, the savings from a smart thermostat are adjusted down to reflect the efficiency gains of installing an efficient air source heat pump. The analysis also prioritizes efficiency measures relative to conservation (behavioral) measures.

4.4.3 Economic Potential

Economic potential refers to the subset of the technical potential that is economically cost-effective (based on screening with the UCT) as compared to conventional supply-side energy resources.

4.4.3.1 Utility Cost Test & Incentive Levels

The economic potential assessment included a screen for cost-effectiveness using the UCT at the measure level. In the NIPSCO territory, the UCT considers electric energy, capacity, and transmission & distribution (T&D) savings as benefits, and utility incentives and direct install equipment expenses as costs. Consistent with application of economic potential, according to the National Action Plan for Energy Efficiency, the measure level economic screening does not consider non-incentive/measure delivery costs (e.g., admin, marketing, evaluation, etc.) in determining cost-effectiveness.[9]

Apart from the low-income segment of the residential sector, all measures were required to have a UCT benefit-cost ratio greater than 1.0 to be included in economic potential and all subsequent estimates of energy efficiency potential. Low-income measures were not required to be cost-effective; all low-income specific measures are included in the economic and achievable potential estimates.

[9] National Action Plan for Energy Efficiency: Understanding Cost-Effectiveness of Energy Efficiency Programs. *Note: Non-incentive delivery costs are included in the assessment of achievable potential.*

For both the calculation of the measure-level UCT, as well as the determination of RAP, historical incentive levels (as a % of incremental measure cost) were calculated for current measure offerings. GDS relied on NIPSCO's DSM Portfolio Summary to map current measure offerings to their historical incentive levels. For study measures that did not map directly to a current offering, GDS used an average incentive of 35% in the residential sector. In the C&I sector, all non-current prescriptive incentive offerings were calculated using the assumed custom incentive, which is offered as a $/first-year kWh saved. The custom program incentive was assumed to be $0.10 per first-year kWh saved for lighting measures and $0.12 per first-year kWh saved for non-lighting measures. These incentive levels were informed, based on discussions with NIPSCO staff, to align with current or expected near-future offer levels:

- In the residential sector, measures included in the lighting products program averaged incentives of 96% of the measure cost.
- Residential Home Rebate and Marketplace measures averaged incentives of 18% and 24% of the measure cost.
- Appliance Recycling, Behavioral, IQW, and School Education measures averaged 90-100% of the measure cost.
- Low income and direct install measures received incentives equal to 100% of the measure cost.
- In the non-residential sector, prescriptive incentives averaged 47% of the measure cost for lighting and 22% of the measure cost for non-lighting measures. SBDI program measures average 65% and 49% for lighting and non-lighting measures, respectively.
- In the MAP scenario, all incentives were set to 100% of the incremental measure cost.

4.4.3.2 Avoided Costs

Avoided energy supply costs are used to assess the value of energy savings. Avoided cost values for electric energy, electric capacity, and avoided T&D were provided by NIPSCO as part of an initial data request. For years outside of the avoided cost forecast timeframe, future year avoided costs are escalated by the rate of inflation.

4.4.4 Achievable Potential

Achievable potential is the amount of energy that can realistically be saved given various market barriers. Achievable potential considers real-world barriers to encouraging end users to adopt efficiency measures; the non-measure costs of delivering programs (for administration, marketing, analysis, and EM&V); and the capability of programs and administrators to boost program activity over time. Barriers include financial constraints, customer awareness and WTP in programs, technical constraints, and other barriers the "program intervention" is modeled to overcome. Additional considerations include political and/or regulatory constraints. The potential study evaluated two achievable potential scenarios:

- ***MAP***, or maximum achievable potential, estimates achievable potential with NIPSCO paying incentives equal to 100% of measure incremental costs and aggressive adoption rates.
- ***RAP***, or realistic achievable potential, estimates achievable potential with NIPSCO paying incentive levels (as a percent of incremental measure costs) closely calibrated to historical levels, but is not constrained by any previously determined spending levels.

4.4.4.1 Market Adoption Rates

GDS assessed achievable potential on a measure-by-measure basis. In addition to accounting for the natural replacement cycle of equipment in the achievable potential scenario, GDS estimated measure specific maximum adoption rates that reflect the presence of possible market barriers and associated difficulties in achieving the 100% market adoption assumed in the technical and economic scenarios.

The initial step in this analysis was to assess the long-term market adoption potential for energy efficiency technologies. Due to the wide variety of measures across multiple end-uses, GDS employed varied measure and end-use-specific ultimate adoption rates, versus a singular universal market adoption curve. These long-term market adoption estimates were based on either NIPSCO-specific WTP market research or publicly available DSM research, including market adoption rate surveys and other utility program benchmarking. These surveys included questions to residential homeowners and nonresidential facility managers regarding their perceived willingness to purchase and install energy efficient technologies across various end uses and incentive levels and are discussed in additional detail in Section 2.4.

One caveat to this approach is that the WTP adoption score is generally a simple function of incentive levels and payback. There are other factors that may influence a customer's willingness to purchase an energy efficiency measure. For example, increased marketing and education programs can have a critical impact on the success of energy efficiency programs. To reflect market barriers beyond total and up-front costs, GDS also included a program awareness factor into the determination of the long-term adoption rate. The adoption rate was based on the WTP survey research, as well as other market research conducted by NIPSCO, related to customer engagement and awareness of energy efficiency programs. The program awareness for the realistic achievable potential ranged from 60-76% and was increased in the maximum achievable scenario (85%) to reflect the likelihood of increased program awareness under more aggressive program delivery strategies. Although we recognize that this approach does not capture every possible factor in determining appropriate long-term adoption levels, it does assign some weight to non-financial considerations in the assessment of long-term energy efficiency potential.

GDS utilized likelihood and willingness-to-participate data to estimate the long-term market adoption potential for both the maximum and realistic achievable scenarios.[10] Table 4-2 presents the long-term market adoption rates at varied incentive levels for the residential sector. Most end-uses are based on the WTP primary market research. Modifications to the NIPSCO-specific WTP research include lighting adoption levels to reflect additional WTP conducted in other jurisdictions (and observed high levels of market acceptance) and behavior. Behavior was set to 100% to reflect that the program design is typically opt-out and participation levels are dictated by the utility. Awareness factors for these programs were also modified accordingly.

TABLE 4-2 RESIDENTIAL LONG-TERM MARKET ADOPTION RATES AT DISCRETE INCENTIVE LEVELS

End Use	0% Incentive	25% Incentive	50% Incentive	75% Incentive	100% Incentive	RAP Awareness	MAP Awareness
Appliances/ Hot Water/Plug Load /Pools	25.3%	43.1%	61.1%	78.8%	97.5%	60%	85%
Insulation/ New Const.	14.3%	28.6%	48.3%	72.0%	96.4%	60%	85%
HVAC	23.0%	39.9%	57.4%	76.8%	96.6%	60%	85%
Lighting	48.9%	59.3%	69.7%	78.5%	88.2%	94.2%	94.2%
Behavior	100.0%	100.0%	100.0%	100.0%	100.0%	100%	100%

[10] For the MAP Scenario, the long-term adoption rate was reached by Year15 (or earlier) and annual participation remained flat in the final five years of the analysis. In the RAP scenario, the analysis assumes the maximum adoption rate is reached over a period of 20-years or less.

Table 4-3 presents the long-term market adoption rates used in the nonresidential sector. Again, the adoption scores were primarily informed by NIPSCO-specific WTP research. To reflect differences in delivery strategy, varying awareness factors were created for different C&I program offerings based on available market data collected by NIPSCO and assumptions about trade ally involvement and impact on future adoption rates.

TABLE 4-3 NONRESIDENTIAL LONG-TERM MARKET ADOPTION RATES BY PAYBACK PERFORMANCE

	10 Year Payback Period	5 Year Payback Period	3 Year Payback Period	1 Year Payback Period	0 Year Payback Period
Major Investment	42.8%	58.1%	67.6%	74.6%	81.2%
Minor Investment	41.0%	56.1%	65.7%	73.1%	80.8%

	Prescriptive	Custom	SBDI	Lighting	MAP
Awareness Factor	67%	76.3%	56.0%	85%	85%%

In the maximum achievable potential scenario, incentives were assumed to represent 100% of the measure cost (0-year payback) and awareness factor was set at a minimum of 85%. GDS then estimated initial year adoption rates by reviewing the current saturation levels of efficient technologies and (if necessary) calibrating the estimates of 2024 annual potential to recent historical levels achieved by NIPSCO's current DSM portfolio. This calibration effort ensures that the forecasted achievable potential in 2024 is realistic and attainable. GDS then assumed a non-linear ramp rate from the initial year market adoption rate to the various long-term market adoption rates for each specific end-use.

4.4.4.2 Non-Incentive Costs

Consistent with National Action Plan for Energy Efficiency (NAPEE) guidelines[11], utility non-incentive costs were included in the overall assessment of cost-effectiveness in the RAP scenario. 2024 direct measure/program non-incentive costs were calibrated to recent projected levels (using NIPSCO's 2022-2023 DSM Plan) and set at:

- $0.135 per first year kWh saved for the Home Rebates Program
- $0.122 per first year kWh saved for the Lighting Products Program
- $0.161 per first year kWh saved for the Home Energy Analysis Program
- $0.111 per first year kWh saved for the Appliance Recycling Program
- $0.146 per first year kWh saved for the School Education Program
- $0.142 per first year kWh saved for the Multifamily Direct Install Program
- $0.069 per first year kWh saved for the Behavioral Program
- $0.127 per first year kWh saved for the New Construction Program
- $0.144 per first year kWh saved for the Home Life EE Calculator Program
- $0.185 per first year kWh saved for the Income Qualified Weatherization Program
- $0.115 per first year kWh saved for the Marketplace Program
- $0.054 per first year kWh saved for prescriptive C&I measures
- $0.056 per first year kWh saved for custom C&I measures; and
- $0.052 per first year kWh saved for small business direct install measures

Non-incentive costs were then escalated annually at the rate of inflation.

[11] National Action Plan for Energy Efficiency (2007). Guide for Conducting Energy Efficiency Potential Studies. Prepared by Optimal Energy. This study notes that economic potential only considers the cost of efficiency measures themselves, ignoring programmatic costs. Conversely, achievable potential should consider the non-measures costs of delivering programs. Pg. 2-4.

5 Residential Energy Efficiency Potential

This section provides the potential results for technical, economic, MAP and RAP for the residential sector. The cost-effectiveness results and budgets for the RAP scenario are also provided.

5.1 SCOPE OF MEASURES & END USES ANALYZED

There were 182 total unique electric measures included in the analysis. Table 5-1 provides the number of measures by end-use and fuel type (the full list of residential measures is provided in Appendix B). The measure list was developed based on a review of current NIPSCO programs, the Indiana TRM, other regional TRMs, and industry documents related to emerging technologies. Data collection activities to characterize measures formed the basis of the assessment of incremental costs, electric energy and demand savings, and measure life.

TABLE 5-1 RESIDENTIAL ENERGY EFFICIENCY MEASURES – BY END USE

End-Use	Number of Unique Measures
Appliances	28
Audit	4
Behavioral	3
HVAC Equipment	58
Lighting	10
Miscellaneous	1
New Construction	6
Plug Loads	8
Pools	4
HVAC Shell	32
Water Heating	28

5.2 RESIDENTIAL ELECTRIC POTENTIAL SAVINGS

Figure 5-1 provides the technical, economic, MAP and RAP results for the 3-year, 10-year, and 20-year timeframes. Table 5-2 provides *cumulative annual* technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The 3-year technical potential is 13.8% of forecasted sales and increased to nearly 39% of sales by 2043. Economic potential is 12.2% of forecasted sales after three years and increases to nearly 35% over the 20-year period. The 3-year MAP is 4.0% and the RAP is 3.1%. Over 20 years, the MAP increases to roughly 27% of sales, and the RAP increases to nearly 15% of sales.

FIGURE 5-1 RESIDENTIAL ELECTRIC ENERGY CUMULATIVE ANNUAL POTENTIAL (AS A % OF RESIDENTIAL SALES)

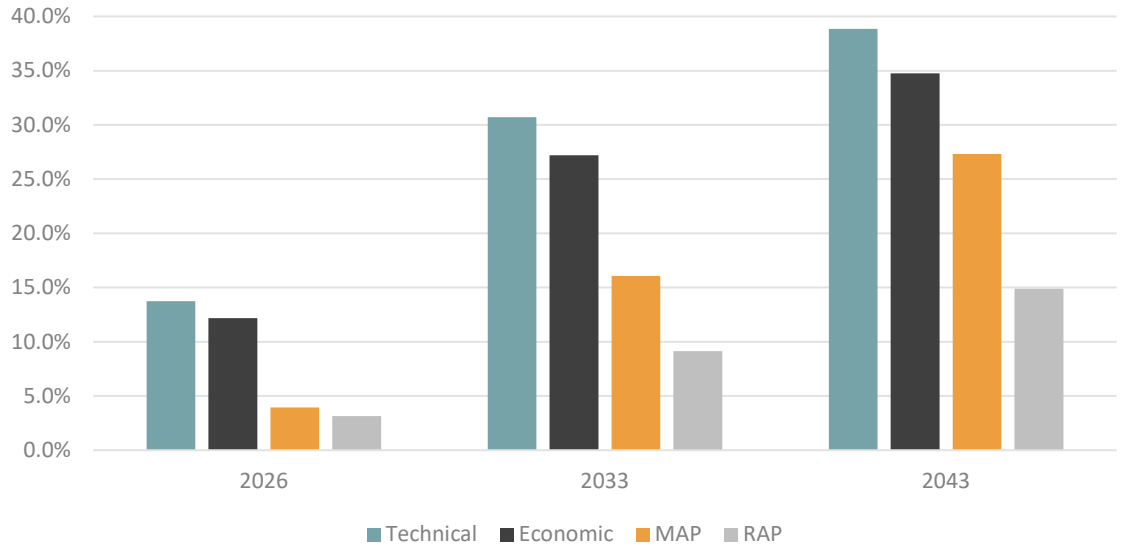


TABLE 5-2 RESIDENTIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MWh					
Technical	189,554	319,751	443,578	1,029,818	1,342,881
Economic	166,026	281,275	392,281	911,929	1,200,947
MAP	50,366	85,608	127,468	539,072	943,612
RAP	45,035	72,106	101,220	305,906	515,223
Forecasted Sales	3,201,962	3,210,840	3,224,697	3,352,295	3,456,206
Energy Savings (as % of Forecast)					
Technical	5.9%	10.0%	13.8%	30.7%	38.9%
Economic	5.2%	8.8%	12.2%	27.2%	34.7%
MAP	1.6%	2.7%	4.0%	16.1%	27.3%
RAP	1.4%	2.2%	3.1%	9.1%	14.9%

Table 5-3 provides the *incremental annual* technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. Incremental technical and economic potential represent 5% or more of sales across most years. The incremental RAP holds steady at 1.4% per year over the next three years.

TABLE 5-3 RESIDENTIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MWh					
Technical	189,554	189,554	189,554	189,554	189,554
Economic	166,026	166,026	166,026	166,026	166,026
MAP	50,366	50,366	50,366	50,366	50,366
RAP	45,035	45,035	45,035	45,035	45,035
Forecasted Sales	3,201,962	3,210,840	3,224,697	3,352,295	3,456,206
Energy Savings (as % of Forecast)					
Technical	5.9%	5.9%	5.9%	5.7%	5.5%
Economic	5.2%	5.2%	5.1%	5.0%	4.8%
MAP	1.6%	1.6%	1.6%	1.5%	1.5%
RAP	1.4%	1.4%	1.4%	1.3%	1.3%

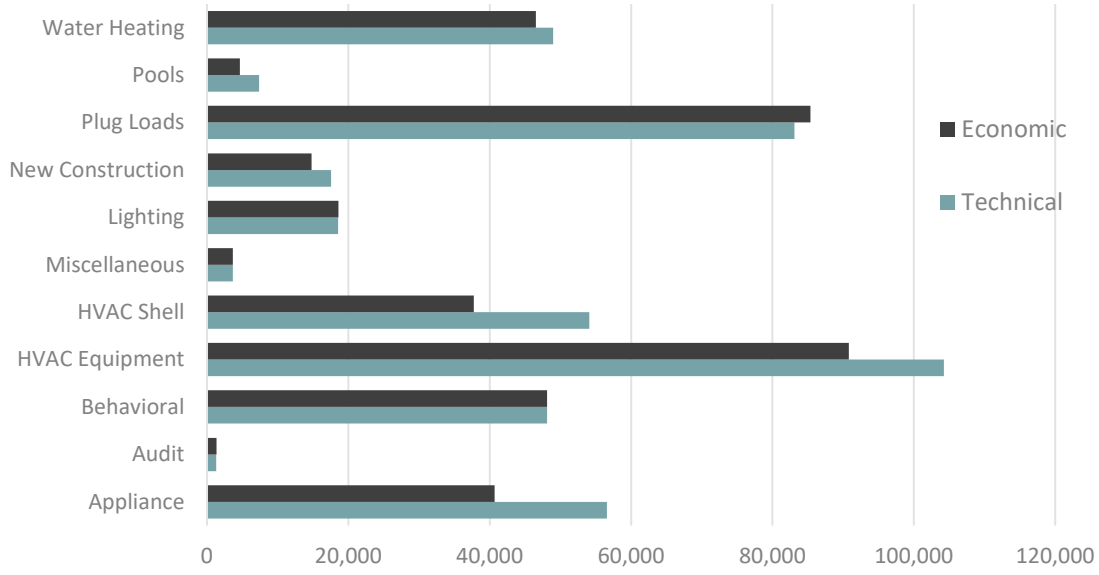
Technical & Economic Potential

Table 5-4 provides cumulative annual technical and economic potential results across the 2024-2026 timeframe, as well as for 2033 and 2043. Figure 5-2 shows a comparison of the technical and economic potential (3-year) by end use. HVAC Equipment and Plug Loads are the leading end-uses among technical and economic potential.

TABLE 5-4 TECHNICAL AND ECONOMIC RESIDENTIAL ELECTRIC POTENTIAL

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	189,554	319,751	443,578	1,029,818	1,342,881
Economic	166,026	281,275	392,281	911,929	1,200,947
Peak Demand (MW)					
Technical	59	109	155	363	454
Economic	47	86	123	298	398

FIGURE 5-2 3-YEAR TECHNICAL AND ECONOMIC RESIDENTIAL ELECTRIC POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 5-3 illustrates the cumulative annual MAP results by end use across the 2024-2026 timeframe. Over the next 3 years, Behavioral, Plug Loads, Appliance and HVAC Equipment measures account for 75% of the potential across the timeframe.

FIGURE 5-3 RESIDENTIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL MWH) MAP POTENTIAL BY END-USE

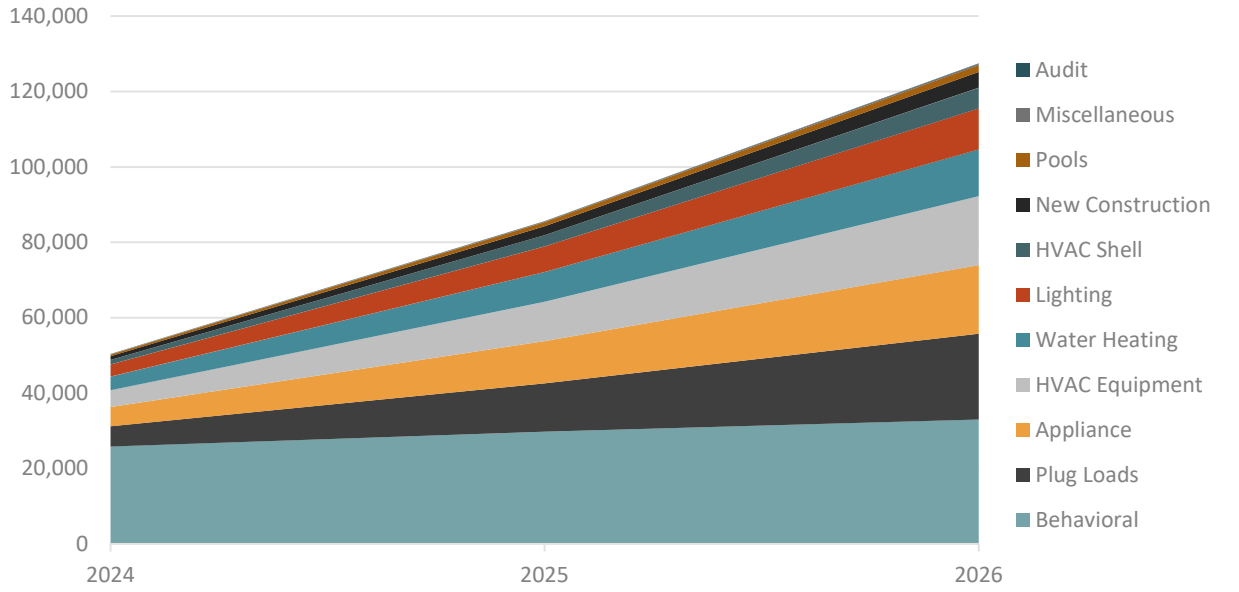


Table 5-5 provides the incremental and cumulative annual MAP across the 2024-2026 timeframe, as well as for 2033 and 2043. Behavioral, Plug Loads, and HVAC Equipment measures provide the greatest cumulative annual MAP over the next three years.

TABLE 5-5 RESIDENTIAL ELECTRIC MAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Appliances	5,133	6,074	6,985	11,050	11,881
Audit	42	62	88	320	362
Behavioral[12]	25,826	29,812	33,028	50,055	53,136
HVAC Equipment	4,453	5,992	7,909	23,944	28,495
HVAC Shell	1,190	1,765	2,539	8,511	6,278
Miscellaneous[13]	85	127	184	863	1,024
Lighting	3,211	3,651	4,009	3,570	5,476
New Construction	980	1,396	1,834	4,179	8,696
Plug Loads	5,352	7,465	9,929	22,016	23,641
Pools	467	598	734	1,269	1,371
Water Heating	3,626	4,220	5,000	11,397	12,080
Total	50,366	61,163	72,240	137,174	152,441
% Of Forecasted Sales	1.6%	1.9%	2.2%	4.1%	4.4%
Incremental Annual MW					
Total	9.4	12.1	15.3	36.8	39.8
% Of Forecasted Demand	0.9%	1.2%	1.5%	3.6%	3.7%

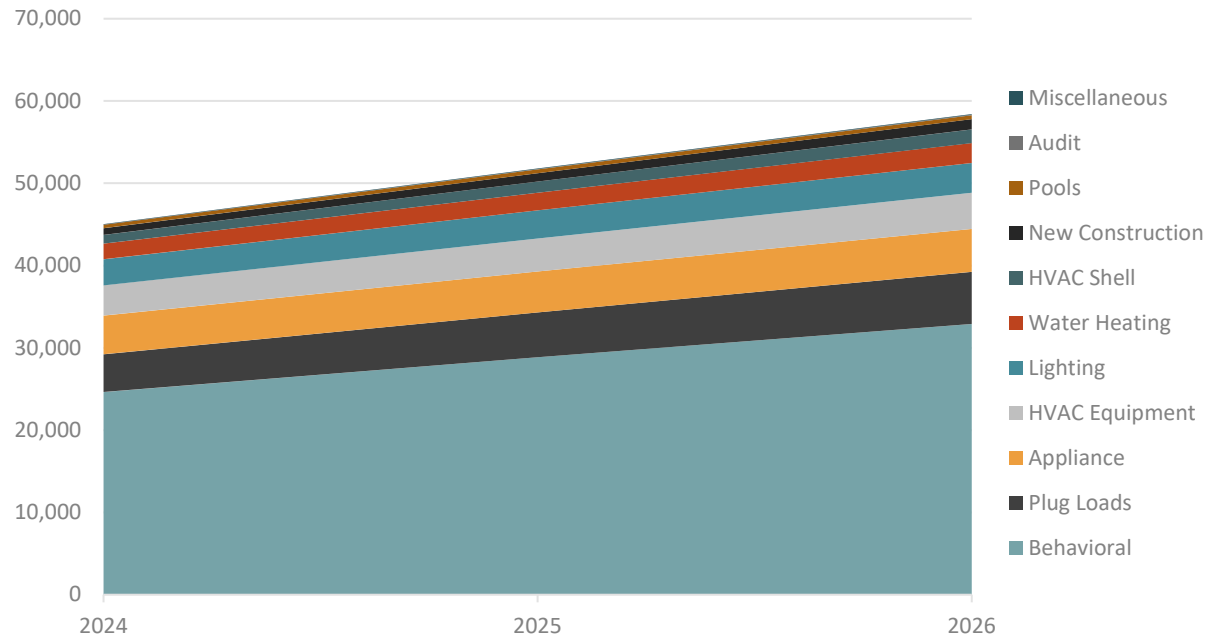
[12] The behavioral end-use includes home energy reports and home energy management systems (HEMs).
[13] Miscellaneous consists of pool heater, efficient pool pumps, motors and timers, and well pumps.

End Use	2024	2025	2026	2033	2043
Cumulative Annual MWh[14]					
Appliances	5,133	11,206	18,190	78,796	117,853
Audit	42	62	88	320	362
Behavioral	25,826	29,812	33,028	50,055	53,136
HVAC Equipment	4,453	10,431	18,300	131,197	305,020
HVAC Shell	1,190	2,945	5,450	46,314	90,958
Miscellaneous	85	212	397	4,387	14,334
Lighting	3,211	6,858	10,859	42,344	55,426
New Construction	980	2,376	4,210	27,855	84,018
Plug Loads	5,352	12,810	22,725	82,922	94,580
Pools	467	1,065	1,798	9,566	16,034
Water Heating	3,626	7,831	12,422	65,317	111,891
Total	50,366	85,608	127,468	539,072	943,612
% Of Forecasted Sales	1.6%	2.7%	4.0%	16.1%	27.3%
Cumulative Annual MW					
Total	9.4	18.5	30.3	174.2	334.1
% Of Forecasted Demand	0.9%	1.9%	3.0%	16.8%	31.3%

Realistic Achievable Potential

Figure 5-4 illustrates the cumulative annual RAP results by end use across the 2024-2026 timeframe. Over the next 3 years, Behavioral, Plug Loads, Appliance and HVAC Equipment measures account for more than 80% of the potential across the timeframe.

FIGURE 5-4 RESIDENTIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) RAP POTENTIAL BY END-USE



[14] Audit measures and most Behavioral measures have a one-year assumed measure life. For this reason, Audit savings are the same for both incremental and cumulative annual, and there is only a minor difference between incremental and cumulative annual savings for Behavioral measures.

Table 5-6 provides the incremental and cumulative annual RAP across the 2024-2026 timeframe, as well as for 2033 and 2043. Behavioral, Plug Loads, and Appliances measures provide the greatest incremental annual MAP over the next three years.

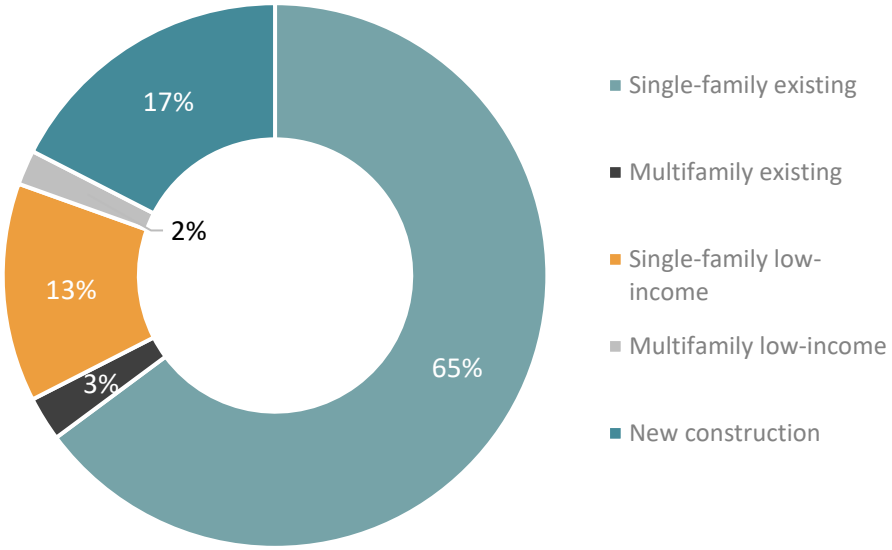
TABLE 5-6 RESIDENTIAL ELECTRIC RAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Appliances	4,705	4,967	5,217	6,449	6,917
Audit	48	61	77	207	256
Behavioral[15]	24,639	28,855	32,900	49,375	53,136
HVAC Equipment	3,660	4,024	4,401	7,409	9,499
HVAC Shell	1,058	1,332	1,646	4,044	4,659
Miscellaneous[16]	43	54	68	283	506
Lighting	3,183	3,419	3,613	2,809	4,767
New Construction	818	1,042	1,257	2,770	6,138
Plug Loads	4,588	5,460	6,332	10,502	11,352
Pools	398	436	473	625	678
Water Heating	1,895	2,140	2,431	5,516	7,964
Total	45,035	51,792	58,414	89,991	105,874
% Of Forecasted Sales	1.4%	1.6%	1.8%	2.7%	3.1%
Incremental Annual MW					
Total	8.5	9.8	11.1	18.3	21.2
% Of Forecasted Demand	0.9%	1.0%	1.1%	1.8%	2.0%
Cumulative Annual MWh[17]					
Appliances	4,705	9,672	14,888	50,296	65,498
Audit	48	61	77	207	256
Behavioral	24,639	28,855	32,900	49,375	53,136
HVAC Equipment	3,660	7,672	12,045	50,003	100,235
HVAC Shell	1,058	2,383	4,012	24,741	65,276
Miscellaneous	43	98	166	1,366	5,754
Lighting	3,183	6,598	10,202	37,021	47,655
New Construction	818	1,860	3,117	18,258	57,838
Plug Loads	4,588	10,043	16,361	39,903	45,522
Pools	398	834	1,307	5,317	7,949
Water Heating	1,895	4,031	6,145	29,419	66,105
Total	45,035	72,106	101,220	305,906	515,223
% Of Forecasted Sales	1.4%	2.2%	3.1%	9.1%	14.9%
Cumulative Annual MW					
Total	8.5	15.5	23.2	85.3	157.0
% Of Forecasted Demand	0.9%	1.6%	2.3%	8.2%	14.7%

[15] The behavioral end-use includes home energy reports and home energy management systems (HEMs).
[16] Miscellaneous consists of pool heater, efficient pool pumps, motors and timers, and well pumps.
[17] Audit measures and most Behavioral measures have a one-year assumed measure life. For this reason, Audit savings are the same for both incremental and cumulative annual, and there is only a minor difference between incremental and cumulative annual savings for Behavioral measures.

Figure 5-5 illustrates a market segmentation of the RAP in the residential sector by 2026. Nearly two-thirds of the RAP is associated with single-family existing homes that are not low-income, whereas the total low-income potential is about 15% of the RAP.[18]

FIGURE 5-5 2026 RESIDENTIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT



5.3 RESIDENTIAL BENEFITS & COSTS (RAP SCENARIO)

Table 5-7 provides the net present value (NPV) benefits and cost, as calculated using the UCT, across the 2024-2043 timeframe for the RAP scenario. The overall UCT ratio is 1.7.

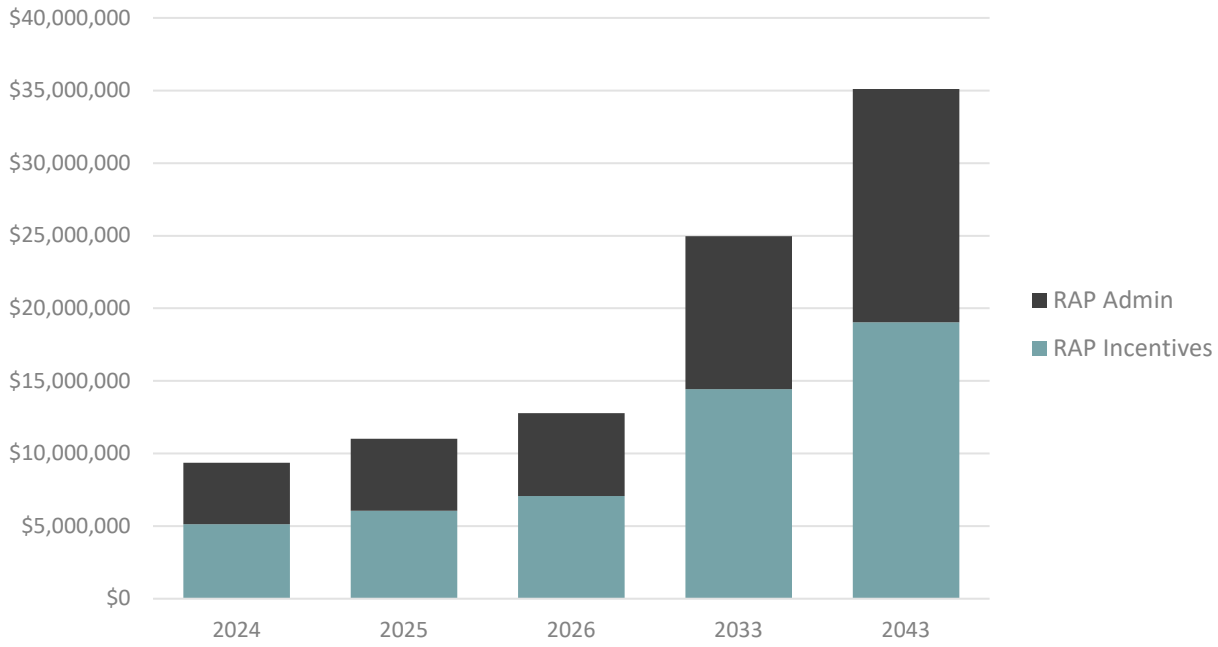
TABLE 5-7 RESIDENTIAL NPV BENEFITS & COSTS RAP BY END-USE ($ IN MILLIONS)

End Use	NPV Benefits	NPV Costs	UCT Ratio
Overall Results			
Appliances	$53,836,634	$28,795,868	1.9
Audit	$343,522	$4,644,810	0.1
Behavioral	$49,775,750	$42,259,152	1.2
HVAC Equipment	$124,462,849	$37,791,480	3.3
HVAC Shell	$98,391,091	$80,666,479	1.2
Miscellaneous	$4,011,250	$1,382,885	2.9
Lighting	$30,027,310	$16,549,384	1.8
New Construction	$20,867,513	$13,376,874	1.6
Plug Loads	$39,688,753	$23,995,866	1.7
Pools	$7,091,340	$2,138,637	3.3
Water Heating	$42,250,971	$21,479,784	2.0
Total	$470,746,985	$273,081,219	1.7

[18] The low-income measures in the RAP analysis did not have to pass the UCT.

Figure 5-6 provides the budget for the RAP scenario. The budget is broken into incentives and admin budgets for each year of the initial 3-years of the study timeframe, as well as the 10-year and 20-year timeframe. The incentive budget rises from $5.1 million to $19.0 million, and overall budgets rise from $9.4 million to $35.1 million by 2043.

FIGURE 5-6 ANNUAL BUDGETS FOR RESIDENTIAL RAP ($ IN MILLIONS)



6 Commercial & Industrial Energy Efficiency Potential

This section provides the potential results for technical, economic, MAP and RAP for the commercial and industrial sectors. Results are broken down by sector and end use. The cost-effectiveness results and budgets for the RAP scenario are also provided.

6.1 SCOPE OF MEASURES & END USES ANALYZED

There were 272 total electric measures included in the C&I analysis. Table 6-1 provides the number of measures by end-use (the full list of measures is provided in the appendices volume of this report). The measure list was developed based on a review of current NIPSCO programs, the Indiana TRM, other regional TRMs, and industry documents related to emerging technologies. Data collection activities to characterize measures formed the basis of the assessment of incremental costs, electric energy and demand savings, and measure life.

TABLE 6-1 C&I ENERGY EFFICIENCY MEASURES – BY END USE

End-Use	# of Unique Commercial Measures	# of Unique Industrial Measures
Lighting (Interior and Exterior)	35	11
HVAC (Heating, Cooling, Ventilation)	55	13
Refrigeration	29	0
Water Heating	9	0
Cooking	10	0
Office Equipment	14	0
Machine Drive	0	31
Process Heating	0	4
Process Cooling/Refrigeration	0	10
Process Other	0	14
Other	13	0
Agriculture	0	15
Behavioral	4	4

6.2 TOTAL C&I ELECTRIC POTENTIAL SUMMARY

Figure 6-1 and Table 6-2 provide the *cumulative annual* technical, economic, MAP and RAP results for the 3-year, 10-year, and 20-year timeframes. The 3-year technical and economic potential are roughly 12.4% of forecasted sales.[19] Technical and economic potential increase to approximately 31% of sales by 2043. The 3-year MAP is 5.5% and the RAP is 4.9%. Over 20 years, the MAP increases to roughly 20% of sales, and the RAP increases to 16.3% of sales.

[19] Technical and economic potential are nearly identical as NIPSCO's historical incentive levels are traditionally structured to ensure a cost-effective delivery option. Additional discussions on the development of assumed incentive levels are included in Section 4.4.3.1

FIGURE 6-1 COMMERCIAL ELECTRIC ENERGY CUMULATIVE ANNUAL POTENTIAL (AS A % OF COMMERCIAL SALES)

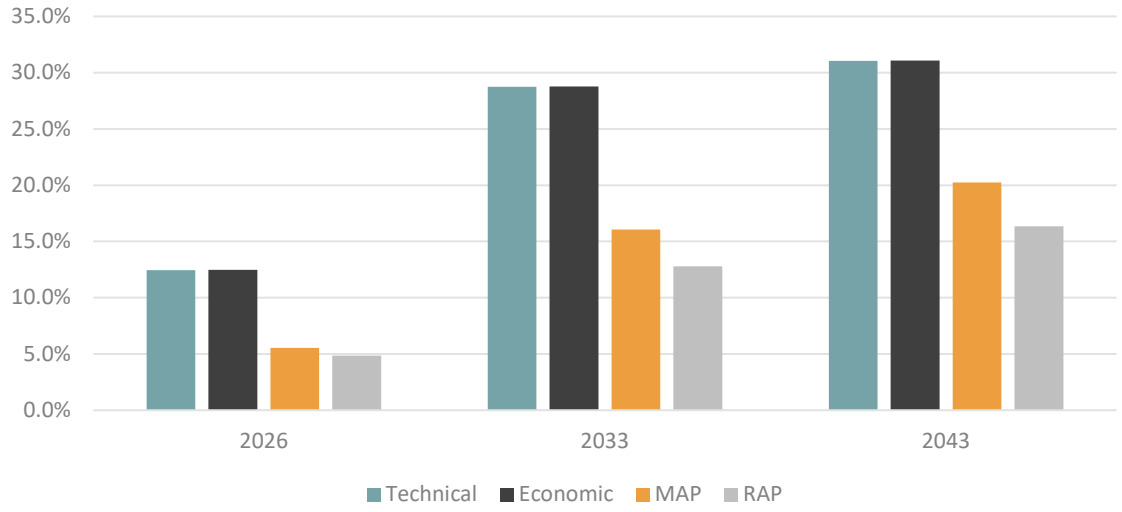


TABLE 6-2 COMMERCIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	200,461	392,065	583,637	1,394,035	1,575,849
Economic	201,014	393,172	585,297	1,395,339	1,577,499
MAP	88,301	174,181	259,712	779,631	1,026,889
RAP	80,368	155,758	227,913	619,913	828,760
Forecasted Sales	4,651,560	4,663,619	4,688,046	4,849,839	5,073,891
Energy Savings (as % of Forecast)					
Technical	4.3%	8.4%	12.4%	28.7%	31.1%
Economic	4.3%	8.4%	12.5%	28.8%	31.1%
MAP	1.9%	3.7%	5.5%	16.1%	20.2%
RAP	1.7%	3.3%	4.9%	12.8%	16.3%

Table 6-3 provides the *incremental annual* technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The incremental RAP ranges from 1.7% to 2.0% per year over the study horizon.

TABLE 6-3 COMMERCIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	200,461	200,461	200,461	169,579	185,013
Economic	201,014	201,014	201,014	170,157	186,047
MAP	88,301	87,749	87,975	113,342	119,949
RAP	80,368	77,256	74,416	84,644	99,757
Forecasted Sales	4,651,560	4,663,619	4,688,046	4,849,839	5,073,891
Energy Savings (as % of Forecast)					
Technical	4.3%	4.3%	4.3%	3.5%	3.6%
Economic	4.3%	4.3%	4.3%	3.5%	3.7%
MAP	1.9%	1.9%	1.9%	2.3%	2.4%
RAP	1.7%	1.7%	1.6%	1.7%	2.0%

6.3 COMMERCIAL ELECTRIC POTENTIAL

This section provides detail regarding the commercial electric energy efficiency potential in the NIPSCO service area. The potential excludes commercial customers who are eligible to opt-out of NIPSCO's energy efficiency programs.

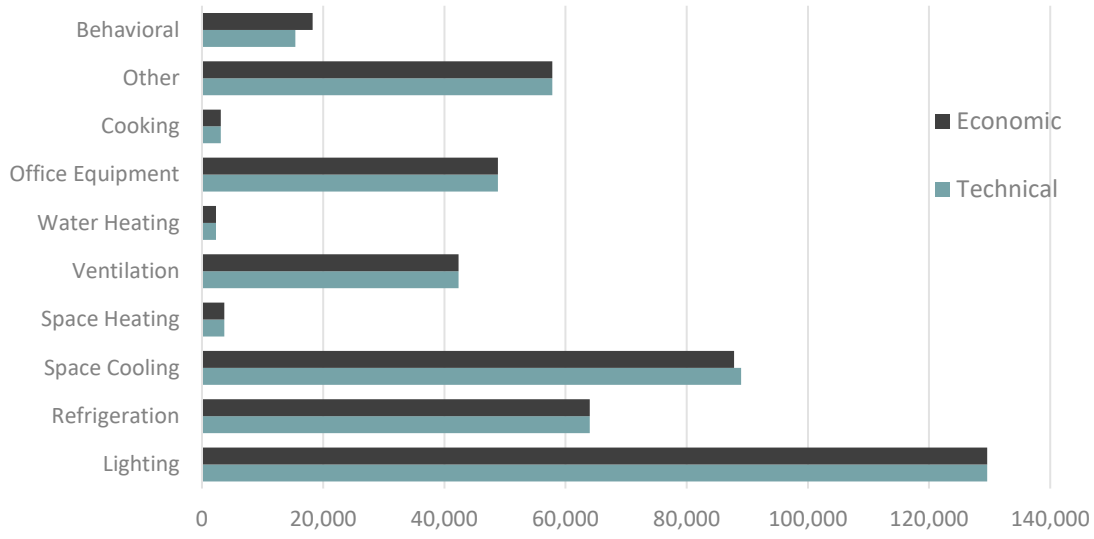
Technical & Economic Potential

Table 6-4 provides cumulative annual technical and economic potential results across the 2024-2026 timeframe, as well as for 2033 and 2043. Figure 6-2 shows a comparison of the 2024-2026 cumulative annual technical and economic potential by end use with Lighting, Refrigeration, and Space Cooling leading. As noted earlier, technical and economic potential are nearly identical in most end-uses as nearly all measures were cost-effective according to the UCT Test.

TABLE 6-4 TECHNICAL & ECONOMIC COMMERCIAL ELECTRIC POTENTIAL

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	153,621	304,864	456,106	1,092,347	1,246,406
Economic	154,175	305,970	457,766	1,093,651	1,248,057
Peak Demand (MW)					
Technical	23	46	69	176	193
Economic	23	46	70	177	195

FIGURE 6-2 3-YEAR TECHNICAL AND ECONOMIC COMMERCIAL ELECTRIC POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 6-3 illustrates the cumulative annual MAP results by end use across the 2024-2026 timeframe. Like technical and economic potential, Lighting accounts for the largest share of cumulative annual potential over the 2024-2026 timeframe. The emphasis on lighting in the MAP (and RAP) potential over the early years of the analysis timeframe is intentional, as the achievable lighting savings were calibrated to reflect

NIPSCO's historical achievements in C&I lighting. Over the 20-year analysis timeframe, as shown in Table 6-5, C&I lighting becomes a smaller share of the incremental and cumulative annual potential, as future lighting opportunities are exhausted.

FIGURE 6-3 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL MWH) MAP POTENTIAL BY END-USE

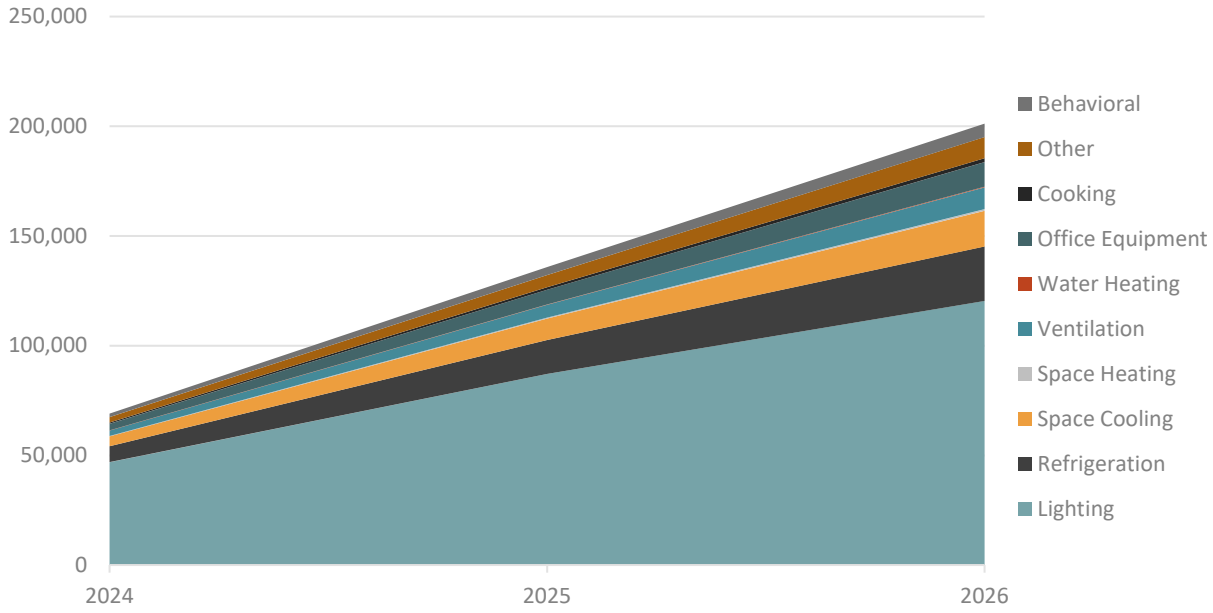


Table 6-5 provides the incremental and cumulative annual MAP across the 2024-2026 timeframe, as well as for 2033 and 2043. In 2024, C&I lighting represents 68% of the MAP savings; C&I lighting represents 34% and 17% of cumulative annual savings at the 10-year and 20-year mark, respectively.

TABLE 6-5 COMMERCIAL ELECTRIC MAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Lighting	46,934	40,155	33,321	12,519	12,519
Refrigeration	7,218	8,262	9,351	14,469	14,923
Space Cooling	4,464	5,312	6,427	19,011	21,547
Space Heating	211	244	287	758	847
Ventilation	2,480	3,281	4,176	9,232	9,853
Water Heating	83	107	139	482	550
Office Equipment	3,032	3,709	4,456	10,628	11,768
Cooking	550	601	640	709	710
Other	2,464	3,256	4,337	13,319	14,528
Behavioral	1,558	2,032	2,510	4,048	4,073
Total	68,994	66,959	65,643	85,174	91,319
% Of Forecasted Sales	2.2%	2.1%	2.1%	2.5%	2.6%
Incremental Annual MW					
Total	12	11	11	12	13
% Of Forecasted Demand	2.1%	2.0%	1.9%	2.1%	2.1%

End Use	2024	2025	2026	2033	2043
Cumulative Annual MWh					
Lighting	46,934	87,088	120,409	209,978	140,907
Refrigeration	7,218	15,480	24,831	89,618	115,618
Space Cooling	4,464	9,776	16,203	95,053	171,802
Space Heating	211	455	742	4,236	8,116
Ventilation	2,480	5,761	9,937	62,124	136,732
Water Heating	83	191	330	2,484	5,011
Office Equipment	3,032	6,741	11,197	47,823	84,636
Cooking	550	1,151	1,791	6,675	8,517
Other	2,464	5,573	9,663	66,816	116,169
Behavioral	1,558	3,590	6,100	15,334	15,979
Total	68,994	135,805	201,201	600,141	803,487
% Of Forecasted Sales	2.2%	4.3%	6.3%	18.0%	22.5%
Cumulative Annual MW					
Total	12	23	33	96	124
% Of Forecasted Demand	2.1%	4.2%	6.0%	16.4%	20.0%

Realistic Achievable Potential

Figure 6-4 illustrates the cumulative annual RAP results by end use across the 2024-2026 timeframe. Like MAP, C&I lighting is the largest contributor to RAP savings over the initial 3-years of the analysis because of the near-term calibration to recent NIPSCO historical achievements. Also, as observed in MAP, however, other end-uses take on larger shares of the incremental and cumulative annual potential as C&I lighting savings begin to be exhausted in the market (see Table 6-6).

FIGURE 6-4 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL MWH) RAP POTENTIAL BY END-USE

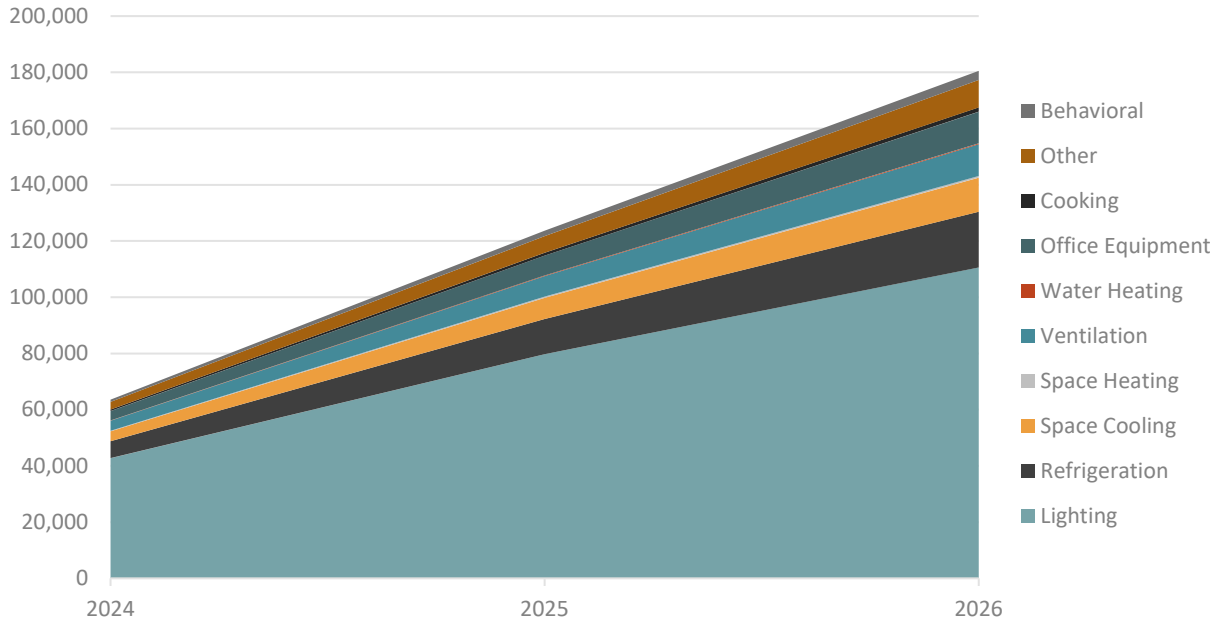


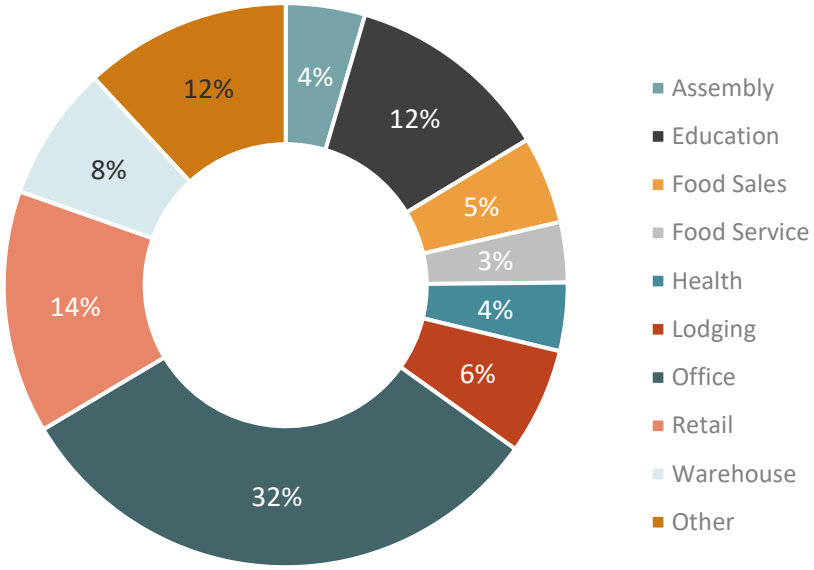
Table 6-6 provides the incremental and cumulative annual RAP across the 2024-2026 timeframe, as well as for 2033 and 2043. Due to the near-term emphasis on lighting in early years, there are minor differences between MAP and RAP. In the RAP scenario, C&I cumulative annual savings increases to 18.3% by 2043. Commercial lighting represents roughly 21% of cumulative annual achievable commercial savings by 2043, followed closely by commercial cooling (20%), commercial ventilation (15%), commercial other (15%) and commercial refrigeration (14%).

TABLE 6-6 COMMERCIAL ELECTRIC RAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Lighting	42,778	36,913	30,928	12,118	12,118
Refrigeration	6,003	6,591	7,212	10,906	11,883
Space Cooling	3,515	3,986	4,589	11,976	17,747
Space Heating	199	225	255	523	631
Ventilation	3,589	3,740	3,902	5,627	7,309
Water Heating	78	92	109	332	501
Office Equipment	3,358	3,742	4,161	7,963	10,234
Cooking	525	527	529	536	537
Other	2,717	3,383	4,167	10,643	12,865
Behavioral	823	1,068	1,336	3,122	3,586
Total	63,584	60,267	57,190	63,747	77,411
% Of Forecasted Sales	2.0%	1.9%	1.8%	1.9%	2.2%
Incremental Annual MW					
Total	10	10	9	10	10
% Of Forecasted Demand	1.8%	1.7%	1.6%	1.5%	1.6%
Cumulative Annual MWh					
Lighting	42,778	79,690	110,618	197,188	135,353
Refrigeration	6,003	12,594	19,806	66,620	90,326
Space Cooling	3,515	7,501	12,090	61,316	130,371
Space Heating	199	423	679	3,078	5,775
Ventilation	3,589	7,329	11,231	44,849	97,710
Water Heating	78	169	279	1,648	4,236
Office Equipment	3,358	7,100	11,261	35,435	69,170
Cooking	525	1,053	1,582	5,321	6,437
Other	2,717	5,885	9,752	54,363	98,852
Behavioral	823	1,891	3,228	10,939	14,022
Total	63,584	123,635	180,526	480,756	652,252
% Of Forecasted Sales	2.0%	3.9%	5.7%	14.4%	18.3%
Cumulative Annual MW					
Total	10	19	28	71	91
% Of Forecasted Demand	1.8%	3.5%	5.0%	12.2%	14.7%

Figure 6-5 illustrates a market segmentation of the RAP in the commercial sector by 2026. Office, Retail, Education, and Other are the leading building types.

FIGURE 6-5 2026 COMMERCIAL ELECTRIC (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT



6.4 INDUSTRIAL ELECTRIC POTENTIAL

This section provides detail regarding the industrial electric energy efficiency potential in the NIPSCO service area. The potential excludes industrial customers who are eligible to opt-out of NIPSCO's energy efficiency programs.

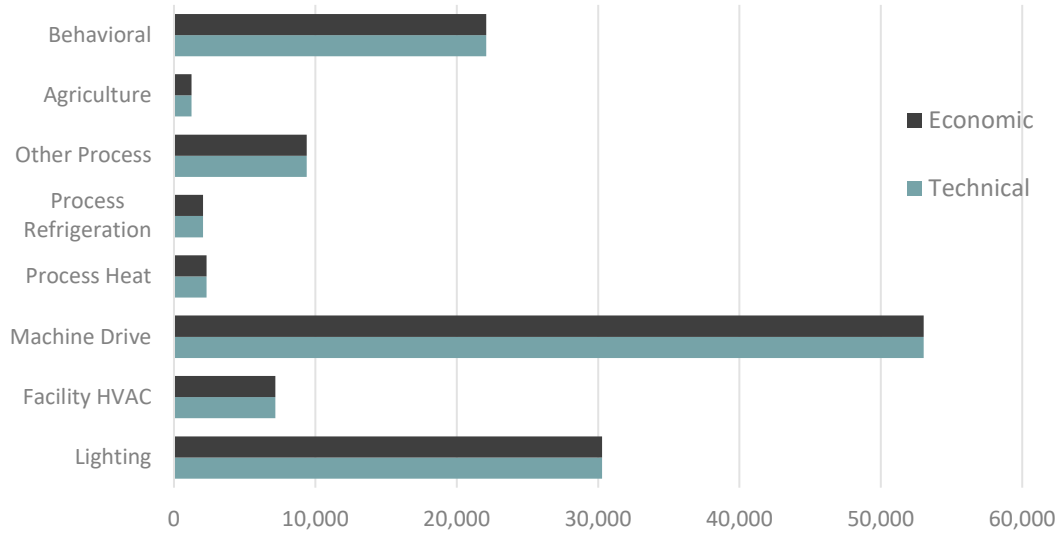
Technical & Economic Potential

Table 6-7 provides cumulative annual industrial technical and economic potential results from 2024-2026, 2033, and 2043. Figure 6-6 shows a comparison of the technical and economic potential (3-year) by end use. Machine Drive and Lighting are the leading end uses among technical and economic potential.

TABLE 6-7 TECHNICAL AND ECONOMIC INDUSTRIAL ELECTRIC POTENTIAL

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	46,840	87,202	127,532	301,688	329,442
Economic	46,840	87,202	127,532	301,688	329,442
Peak Demand (MW)					
Technical	10	19	28	70	77
Economic	10	19	28	70	77

FIGURE 6-6 THREE-YEAR TECHNICAL AND ECONOMIC INDUSTRIAL ELECTRIC POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 6-7 illustrates the cumulative annual MAP results by end use across the 2024-2026 timeframe. Lighting and Machine Drive are the two end-uses with the largest share of near-term potential. Table 6-8 shows the incremental and cumulative annual industrial MAP potential for the 2024-2026 timeframe, as well as the 10-year and 20-year outlook. In addition to Lighting and Machine Drive, the long-term potential depicts substantial combined savings from Facility HVAC, Other Process, and Behavioral (SEM) by 2043.

FIGURE 6-7 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL MWH) MAP POTENTIAL BY END-USE

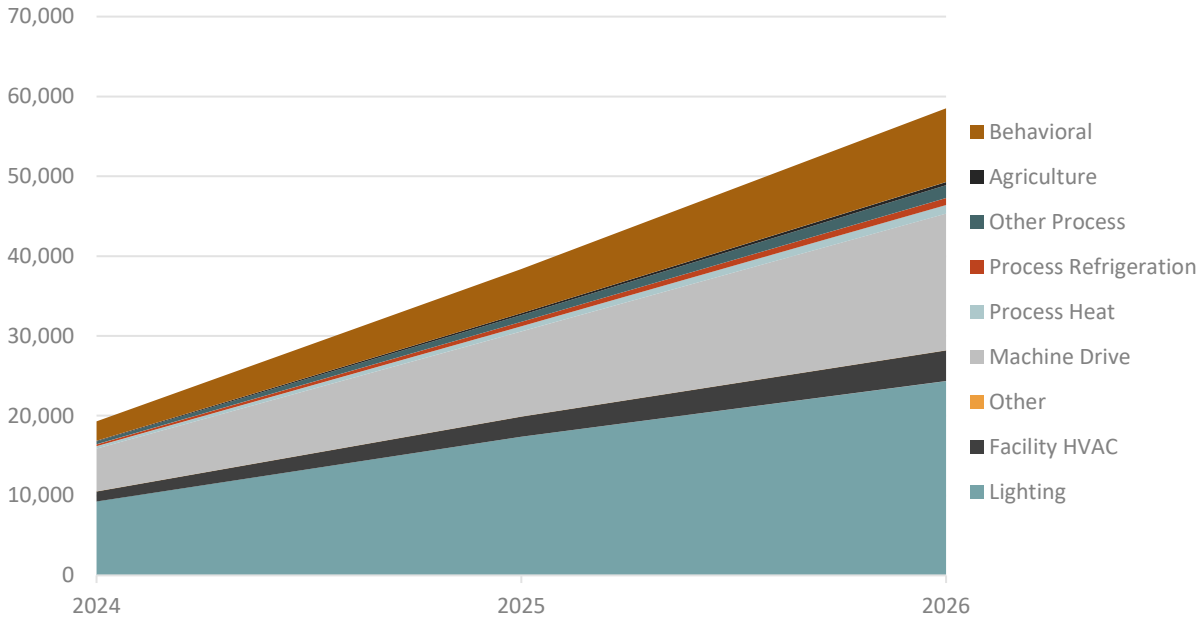


TABLE 6-8 INDUSTRIAL ELECTRIC MAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Lighting	9,256	8,011	6,966	2,594	2,594
Facility HVAC	1,264	1,283	1,308	1,601	1,662
Other	0	0	0	0	0
Machine Drive	5,363	6,995	8,681	15,189	15,474
Process Heat	303	364	415	533	533
Process Refrigeration	242	294	341	476	480
Other Process	341	521	745	2,052	2,162
Agriculture	97	131	165	288	291
Behavioral	2,440	3,092	3,710	5,436	5,436
Total	19,306	20,791	22,332	28,169	28,630
% Of Forecasted Sales	1.3%	1.4%	1.5%	1.9%	1.9%
Incremental Annual MW					
Total	5	5	5	6	6
% Of Forecasted Demand	1.9%	2.0%	2.1%	2.4%	2.5%
Cumulative Annual MWh					
Interior Lighting	9,256	8,111	24,334	47,802	27,241
Facility HVAC	1,264	2,546	3,854	14,195	23,520
Other	0	0	0	0	0
Machine Drive	5,363	10,638	17,137	71,318	101,300
Process Heat	303	667	1,082	4,638	7,364
Process Refrigeration	242	536	865	3,789	7,698
Other Process	341	862	1,607	12,206	28,353
Agriculture	97	226	389	2,070	3,684
Behavioral	2,440	5,533	9,243	23,473	24,241
Total	19,306	38,376	58,511	179,491	223,402
% Of Forecasted Sales	1.3%	2.5%	3.9%	11.9%	14.8%
Cumulative Annual MW					
Total	5	9	14	41	52
% Of Forecasted Demand	1.9%	3.7%	5.6%	16.9%	21.2%

Realistic Achievable Potential

Figure 6-8 illustrates the cumulative annual RAP results by end use across the 2024-2026 timeframe. Like MAP, Machine Drive and Lighting are the leading end uses. Also, like MAP, Table 6-9 includes the 10-year and 20-year incremental and cumulative potentials. Over the long-term, Facility HVAC, Other Process, and Behavioral all account for significant levels of remaining potential.

FIGURE 6-8 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL MWH) RAP POTENTIAL BY END-USE

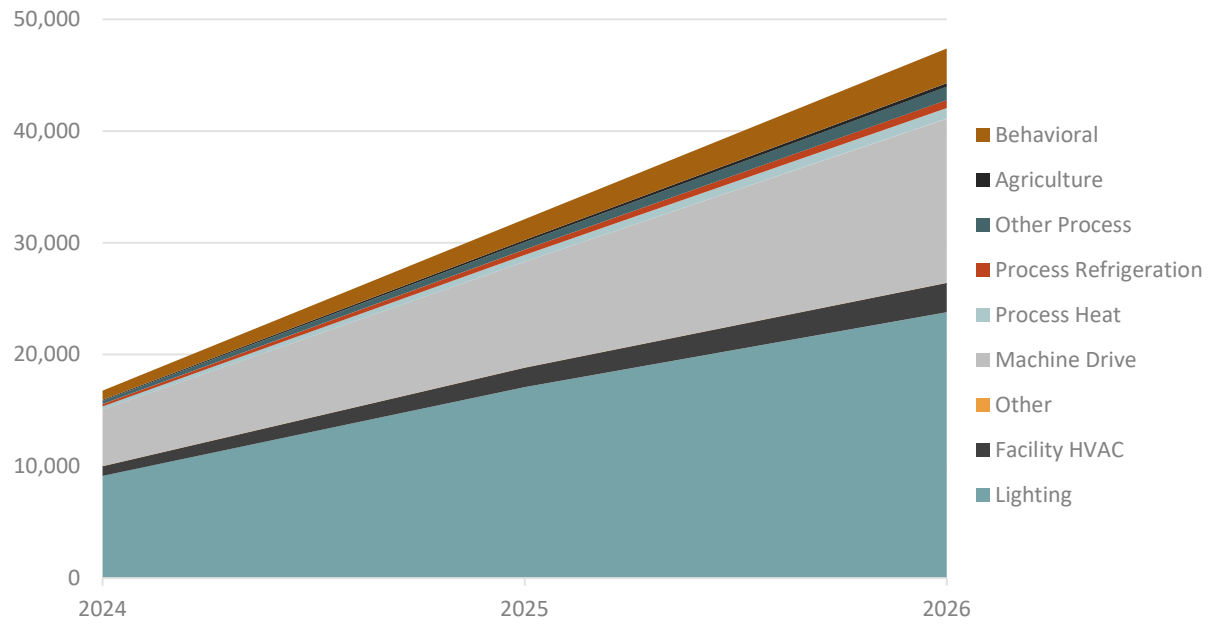


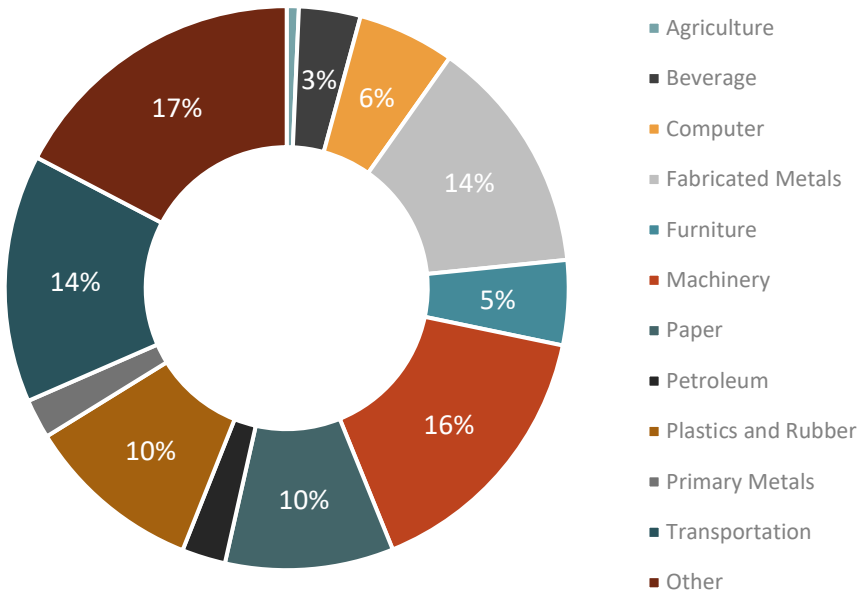
TABLE 6-9 INDUSTRIAL ELECTRIC RAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Interior Lighting	9,148	7,929	6,711	2,649	2,649
Facility HVAC	869	877	887	1,026	1,133
Other	0	0	0	0	0
Machine Drive	5,062	6,087	7,127	12,457	13,348
Process Heat	282	319	352	462	462
Process Refrigeration	218	249	277	391	401
Other Process	289	395	517	1,478	1,781
Agriculture	85	101	116	181	186
Behavioral	831	1,032	1,237	2,255	2,388
Total	16,784	16,989	17,226	20,897	22,347
% Of Forecasted Sales	1.1%	1.1%	1.1%	1.4%	1.5%
Incremental Annual MW					
Total	4	4	4	5	5
% Of Forecasted Demand	1.7%	1.7%	1.6%	1.8%	2.0%
Cumulative Annual MWh					
Interior Lighting	9,148	17,078	23,788	46,797	27,788
Facility HVAC	869	1,746	2,633	9,349	16,008
Other	0	0	0	0	0
Machine Drive	5,062	9,501	14,682	56,990	85,471
Process Heat	282	601	953	3,962	6,372
Process Refrigeration	218	466	732	3,065	6,290

End Use	2024	2025	2026	2033	2043
Other Process	289	684	1,201	8,335	21,561
Agriculture	85	185	299	1,337	2,289
Behavioral	831	1,863	3,100	9,322	10,730
Total	16,784	32,123	47,388	139,157	176,508
% Of Forecasted Sales	1.1%	2.1%	3.1%	9.2%	11.7%
Cumulative Annual MW					
Total	4	8	11	32	40
% Of Forecasted Demand	1.7%	3.1%	4.6%	13.0%	16.3%

Figure 6-9 illustrates a market segmentation of the RAP in the industrial sector by 2026. Machinery, Fabricated Metals, Transportation, and Other are the leading market segments.

FIGURE 6-9 2026 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT[20]



6.5 C&I SECTOR BENEFITS & COSTS (RAP SCENARIO)

[20] Missing values reflect savings < 2% of 2026 cumulative annual realistic achievable potential. "Other" industrial includes: printing, wood, apparel/leather, textile mill products, electrical equipment, nonmetallic minerals, chemicals, and miscellaneous industrial.

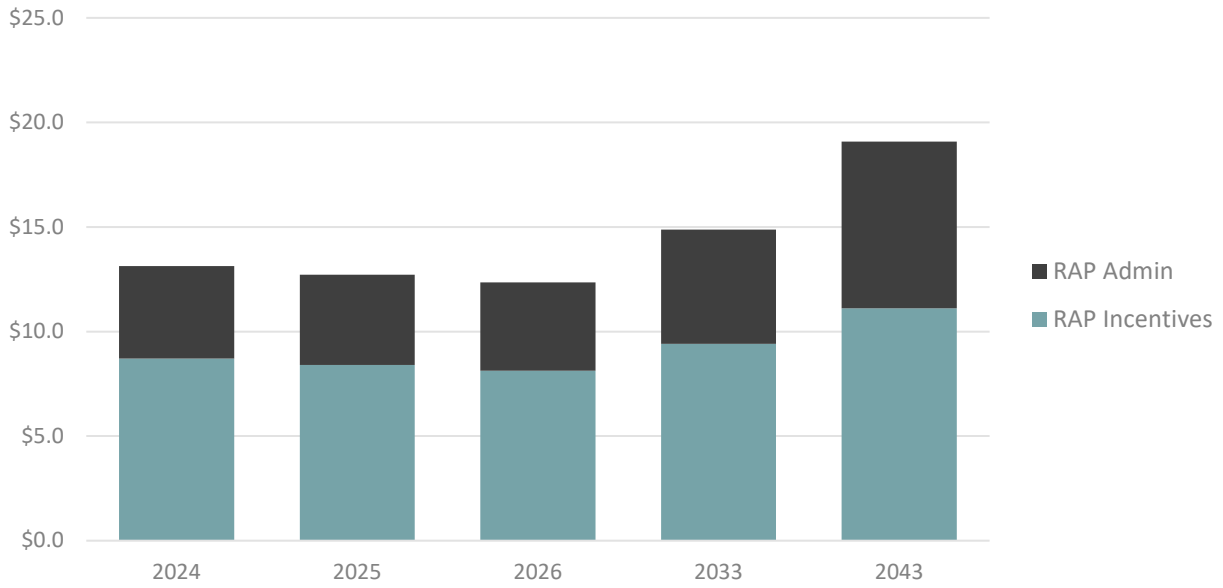
Table 6-10 provides the NPV benefits and costs, as calculated using the UCT, across the 2024-2043 timeframe for the RAP scenario. Commercial Space Cooling, Interior Lighting, and Refrigeration, as well as Industrial Machine Drive, provide the most significant NPV benefits. Overall, the C&I sector has an estimated 4.8 UCT ratio based on the entire 20-year RAP potential.

TABLE 6-10 C&I NPV BENEFITS & COSTS RAP BY END-USE ($ IN MILLIONS)

End Use	NPV Benefits	NPV Costs	UCT Ratio
Commercial			
Interior Lighting	$216.6	$36.6	5.9
Exterior Lighting	$2.8	$0.6	4.9
Refrigeration	$81.8	$21.4	3.8
Space Cooling	$127.6	$23.4	5.4
Space Heating	$3.3	$1.0	3.2
Ventilation	$59.2	$11.1	5.3
Water Heating	$2.6	$0.6	4.7
Office Equipment	$38.4	$12.5	3.1
Cooking	$7.8	$1.0	8.2
Other	$70.3	$17.8	4.0
Behavioral	$10.9	$3.8	2.8
Industrial			
Interior Lighting	$49.7	$13.3	3.7
Exterior Lighting	$0.8	$0.2	4.5
Facility HVAC	$23.8	$2.0	12.1
Other	$0.0	$0.0	-
Machine Drive	$82.7	$18.1	4.6
Process Heat	$6.8	$0.9	7.6
Process Refrigeration	$5.8	$0.7	8.4
Other Process	$17.6	$2.5	7.1
Agriculture	$3.6	$0.3	10.5
Behavioral	$9.1	$2.4	3.8
C&I Totals			
Commercial Total	$621.3	$129.8	4.8
Industrial Total	$199.9	$40.4	5.0
C&I Combined	$821.2	$170.2	4.8

Figure 6-10 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the initial 3-years of the study timeframe, as well as the 10-year and 20-year timeframe. The incentives budget rise from $8.2 million to $11.1 million, and overall budgets rise from $13.1 million to $19.1 million by 2043. The slight decrease over the initial three years is attributed to fewer C&I lighting opportunities. Over the entire study horizon, potential steadily increases in other non-lighting end-uses, resulting in an overall increase in expected program costs over the 10-year and 20-year periods.

FIGURE 6-10 ANNUAL BUDGETS FOR C&I RAP ($ IN MILLIONS)



6.6 C&I POTENTIAL INCLUDING OPT-OUT CUSTOMERS

Table 6-11 provides the incremental annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast, excluding opt-out customers. This is the same information provided in Section 6.2. The cumulative annual energy savings across the 20-year study timeframe are also shown in the far-right column. For comparison, Table 6-12 provides the incremental annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast, including opt-out customers. The increase in potential is largely attributed to the industrial sector, with only a small amount of eligible opt-out customers included in the commercial class.

The 20-year RAP is 828,760 MWh, excluding opt-out customers. This figure rises to 1,832,052 MWh with opt-out customers included. However, overall RAP savings (as a % of sales) decreased from 16.3% to 14.9% when including all current opt-out customers in the assessment of potential. [21]

TABLE 6-11 C&I INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY – EXCLUDING OPT-OUT CUSTOMERS

	2024	2025	2026	2033	2043	2043 (cumulative)
MWh						
Technical	200,461	200,461	200,461	169,579	185,013	1,575,849
Economic	201,014	201,014	201,014	170,157	186,047	1,577,499
MAP	88,301	87,749	87,975	113,342	119,949	1,026,889
RAP	80,368	77,256	74,416	84,644	99,757	828,760
Forecasted Sales	4,651,560	4,663,619	4,688,046	4,849,839	5,073,891	5,073,891
Energy Savings (as % of Forecast)						

[21] Current opt-out customers are overwhelmingly attributed to the industrial/manufacturing customer class, which has a lower overall savings potential (as a % of sales) than commercial customers. As a result, the combined C&I savings as a percent of C&I sales decreases compared to when opt-out customers are excluded.

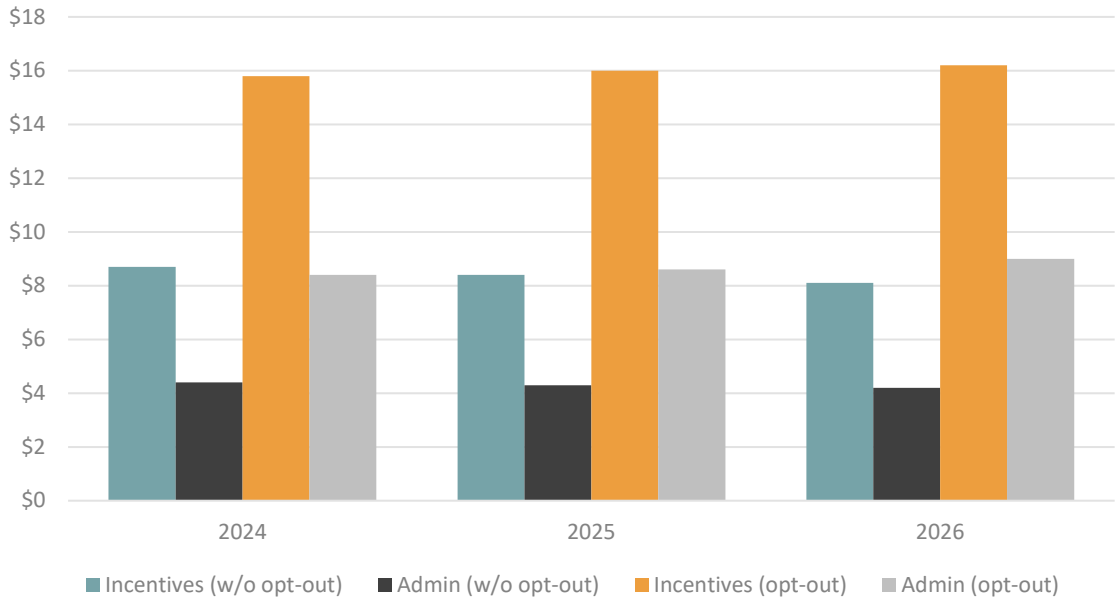
	2024	2025	2026	2033	2043	2043 (cumulative)
Technical	4.3%	4.3%	4.3%	3.5%	3.6%	31.1%
Economic	4.3%	4.3%	4.3%	3.5%	3.7%	31.1%
MAP	1.9%	1.9%	1.9%	2.3%	2.4%	20.2%
RAP	1.7%	1.7%	1.6%	1.7%	2.0%	16.3%

TABLE 6-12 C&I INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY – INCLUDING OPT-OUT CUSTOMERS

	2024	2025	2026	2033	2043	2043 (cumulative)
MWh						
Technical	509,729	509,729	509,729	460,843	476,278	3,627,600
Economic	510,424	510,424	510,424	461,565	477,512	3,629,723
MAP	190,730	207,628	225,521	319,068	329,582	2,451,227
RAP	153,207	155,952	159,194	209,998	236,434	1,832,052
Forecasted Sales	11,795,521	11,808,596	11,837,544	12,029,277	12,294,791	12,294,791
Energy Savings (as % of Forecast)						
Technical	4.3%	4.3%	4.3%	3.8%	3.9%	29.5%
Economic	4.3%	4.3%	4.3%	3.8%	3.9%	29.5%
MAP	1.6%	1.8%	1.9%	2.7%	2.7%	19.9%
RAP	1.3%	1.3%	1.3%	1.7%	1.9%	14.9%

Figure 6-11 provides the budget for the RAP scenario, with and without opt-out customers. The budget is broken into incentive and admin budgets for each year of the 2024-2026 timeframe. The combined budgets without opt-out customers decrease slightly from $13.3 million to $12.4 million by 2026. The combined budgets with opt-out customers included increase from $24.2 million to $25.1 million by 2026.

FIGURE 6-11 ANNUAL BUDGETS FOR COMMERCIAL RAP ($ IN MILLIONS) – WITH AND WITHOUT OPT-OUT CUSTOMERS



PREPARED BY GDS

NIPSCO

NORTHERN INDIANA PUBLIC SERVICE

Demand Side Management Market Potential Study

VOLUME I ELECTRIC ENERGY EFFICIENCY POTENTIAL

2021

GDS Associates, Inc.
ENGINEERS & CONSULTANTS

Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

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1 Introduction

1.1 BACKGROUND & STUDY SCOPE

This natural gas Market Potential Study ("MPS") was conducted to inform the remaining potential for gas savings in the NIPSCO service area and help inform future gas energy efficiency program planning efforts. The study leveraged primary market research (conducted in coordination with the electric energy efficiency potential assessment) and a comprehensive review of current programs, historical savings, and projected energy savings opportunities, to develop estimates of technical, economic, and achievable potential. This report discusses the analysis and results for the gas energy efficiency potential analysis. Estimates of electric energy efficiency and demand response potential were developed and are included in separate volumes. The effort was highly collaborative, as the GDS Team worked closely alongside the NIPSCO Oversight Board (OSB) to produce reliable estimates of future savings potential, using the best available information and best practices for developing market potential savings estimates.

1.2 TYPES OF POTENTIAL ESTIMATED

The scope of this study distinguishes three types of energy efficiency potential: (1) technical, (2) economic, and (3) achievable.

- ***Technical Potential*** is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is constrained only by factors such as technical feasibility and applicability of measures.
- ***Economic Potential*** refers to the subset of the technical potential that is economically cost-effective as compared to conventional supply-side energy resources. Economic potential follows the same adoption rates as technical potential. Like technical potential, the economic scenario ignores market barriers to ensuring actual implementation of efficiency. Finally, economic potential only considers the costs of efficiency measures themselves, ignoring any programmatic costs (e.g., marketing, analysis, administration) that would be necessary to capture them. This study uses the Utility Cost Test (UCT) to assess cost-effectiveness.
- ***Achievable Potential*** is the amount of energy that can realistically be saved given various market barriers. Achievable potential considers real-world barriers to encouraging end users to adopt efficiency measures; the non-measure costs of delivering programs (for administration, marketing, analysis, and EM&V); and the capability of programs and administrators to boost program activity over time. Barriers include financial constraints, customer awareness and willingness to participate in programs, technical constraints, and other barriers that the "program intervention" is modeled to overcome. The potential study evaluated two achievable potential scenarios:
- ***Maximum Achievable Potential (MAP)*** estimates achievable potential with NIPSCO paying incentives equal to 100% of measure incremental costs, while assuming strong adoption rates from aggressive customer education and program marketing.
- ***Realistic Achievable Potential (RAP)*** estimates achievable potential with NIPSCO paying incentive levels (as a percent of incremental measure costs) closely calibrated to current levels, but is not constrained by any previously determined spending levels.[1]

[1] An assessment of potential assuming current incentive levels provides a clear understanding of the remaining potential under present day conditions. NIPSCO's incentives are typically set to ensure cost-effectiveness under the Utility Cost Test. As part of ongoing EM&V efforts, NIPSCO monitors participant satisfaction and the influence of incentives on participation.

1.3 STUDY LIMITATIONS

As with any assessment of energy efficiency potential, this study necessarily builds on various assumptions and data sources, including the following:

- Energy efficiency measure lives, savings, and costs
- Projected penetration rates for energy efficiency measures
- Projections of gas avoided costs
- Future known changes to codes and standards
- NIPSCO load forecasts and assumptions on their disaggregation by sector, segment, and end use
- End-use saturations and fuel shares

While the GDS team has sought to use the best and most current available data (including the use of new primary market research in key market subsegments of interest based on stakeholder feedback) there are often reasonable alternative assumptions which would yield slightly different results. For instance, the analysis assumes that many existing measures, regardless of their current efficiency levels, can be eligible for future installation and savings opportunities. Other studies may select a narrower viewpoint, limiting the amount of potential from equipment that is already considered to be energy efficient. Additionally, the models used in this analysis must make several assumptions regarding program delivery and the timing of equipment replacement, which may ultimately occur more rapidly (or more slowly) than currently forecasted.

Furthermore, while the lists of energy efficiency measures examined in this analysis represent technologies available on the market today, as well as several emerging technologies not currently offered by NIPSCO, these measure lists may not be exhaustive. The GDS team acknowledges that new efficient technologies may become available, particularly over the course of a 20-year timeframe, that could produce efficiency gains and costs at different levels than those currently assumed.

Last, where possible, the GDS Team and NIPSCO collaborated to ensure consistency with assumptions and methodological considerations that are expected to be employed during the program planning process. However, final program designs and implementation strategies may need additional flexibility to target specific or underserved markets, address equity concerns, or react to changing customer preferences.

1.4 ORGANIZATION OF REPORT

The remainder of this volume is organized in seven sections as follows:

Section 2 MPS-Related Market Research details the primary market research studies completed in conjunction with the market potential analysis.
Section 3 MPS Methodology details the methodology used to develop the estimates of technical, economic, and achievable energy efficiency potential savings.
Section 4 MPS Market Characterization provides an overview of the NIPSCO service areas and a brief discussion of the forecasted energy sales by sector.
Section 5 Residential Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the residential sector.
Section 6 Commercial and Industrial Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the commercial and industrial (C&I) sectors.

Appendices for the DSM Market Potential Study are included in Volume IV of this report. The appendices list detailed measure level assumptions and select outputs by customer segment.

2 MPS-Related Market Research[2]

The initial step in the assessment of future potential is to develop a clear understanding of the current market segments, as well as a clear understanding of the market research data available in the NIPSCO service territory. In late 2019 and early 2020, Skill Demand Energy was retained by GDS to conduct the primary market research that would inform critical elements of the market potential study ("MPS"). The research objectives were developed in coordination with NIPSCO and the potential study team. Primary market research activities were focused on collecting updated equipment penetration, saturation, and efficiency characteristics; and customer willingness to participate (WTP) in program offerings across select end-uses/measures.

The resulting data was used to develop updated estimates of baseline and efficient equipment saturation estimates in the market potential study and develop expected long-term adoption rates for energy efficiency over the study horizon. The following section provides an overview of the market research plan and major deliverables of primary importance to the assessment of energy efficiency potential.

2.1 PRIMARY DATA COLLECTION ACTIVITIES

The following subsections provide an overview of the primary data collection activities conducted by Skill Demand Energy and GDS to support the market potential analysis of energy efficiency potential. GDS conducted survey research in the residential and commercial sectors. Due to the significant amount of industrial opt-out customers, GDS and NIPSCO did not focus research on the industrial sector.

2.1.1 Residential Online/Mail-In Survey Sample

The residential customer research targeted homeowners and tenants occupying single family (SF) and multifamily (MF) homes where NIPSCO supplies electricity only, gas only, or both. A residential online customer survey, conducted by GDS, collected home characteristics and equipment penetration for key end-uses such as heating, cooling, water heating, electronics, thermostats, and major appliances. Surveys were either mailed in or completed online. GDS oversampled in the multifamily sector to get a larger overall sample of customers and applied weighting factors (discussed in 2.1.4) to account for observed differences between the sample and overall population. GDS targeted 250 completed online/mail-in surveys and received a total of 336 completes. Table 2-1 shows the results of the online/mail-in survey by housing type and NIPSCO customer type.

TABLE 2-1 TARGETED AND COMPLETED RESIDENTIAL SECTOR ONLINE/MAIL-IN SURVEYS

Residential Online/Mail-In Survey	SF	MF	Total Completed
Electric Only	9	29	38
Gas Only	66	13	79
Electric & Gas Customer	117	102	219
Total	192	144	336

[2] This section can also be found in the Volume I: Electric Energy Efficiency Potential Report. The market research collected as part of the MPS focused primarily on electric-consuming equipment but also collected information on major gas equipment. Similarly, the willingness to participate data generally focused on broad end-uses and was considered applicable to the natural gas MPS analysis as well.

2.1.2 Residential On-Site Survey Sample

The residential on-site visits collected detailed information on building characteristics as well as the penetration, saturation, and detailed characteristics of key energy using equipment (including the specific type of heating, cooling, and water heating equipment; lighting; insulation; major appliances; electronics; insulation; pool pumps; and windows and doors). Additionally, information on barriers to entry and willingness-to-adopt a range of energy efficient measures at varying incentive levels was collected.

GDS developed the sample of on-site visits from the respondents to the residential online/mail-in survey (a nested sampling approach) and Skill Demand Energy completed the on-site surveys. The target number of completed on-site visits was 68. Skill Demand Energy almost reached the target with 65 visits of residential customers.

TABLE 2-2 TARGETED AND COMPLETED RESIDENTIAL SECTOR ON-SITE SURVEYS

Residential On-Site Survey	SF	MF	Total Completed
Electric Only	2	5	7
Gas Only	15	2	17
Electric & Gas Customer	30	11	41
Total	47	18	65

2.1.3 Commercial On-Site Survey Sample

Primary data collection in the business sector included on-site surveys of business customers. The survey collected business and facility characteristics, as well as equipment penetrations and saturations for key end-uses, such as lighting, heating, cooling, water heating, building envelope, and refrigeration. The business on-site survey also collected information on barriers to energy efficiency and willingness-to-adopt energy efficient measures under various incentive offerings. The target number of completed on-site visits was 68 and Skill Demand Energy reached that target.

TABLE 2-3 TARGETED AND COMPLETED COMMERCIAL SECTOR ON-SITE SURVEYS

Commercial On-Site Survey	Total Completed
Electric Only	19
Gas Only	22
Electric & Gas Customer	27
Total	68

2.1.4 Sample Weight

The data acquired through the online/mail-in and on-site surveys was used to determine several penetrations and saturations used in the potential study. Before this data could be used, however, weighting factors needed to be applied to account for observed differences between the completed sample and the population.

To determine the weighting factors, population percentages derived from the complete residential and nonresidential databases for electric, gas, and combination customers, were compared to the number of surveys completed in the market research sample. Weighting factors were applied to “electric only” and “combination” customers for relevant electric penetration/saturation data. Additional weighting factors were applied “gas only” and “combination” customers for relevant gas penetration/saturation data.

Table 2-4 provides the weighting factors used for the residential online, residential onsite, and commercial on-site survey results.

TABLE 2-4 WEIGHTING FACTORS FOR PENETRATION/SATURATION DATA BY MARKET RESEARCH ACTIVITY

	Weighting Factors	Res On-line		Res On-Site		Com On-Site
		SF	MF	SF	MF	
Electric Total	Electric Only Weighting Factor	1.5	1.4	1.7	1.0	0.55
	Combination Weighting Factor	1.0	0.9	1.0	1.0	1.32
Gas Total	Gas Only Weighting Factor	1.4	7.3	1.6	5.3	0.69
	Combination Weighting Factor	0.8	0.2	0.7	0.2	1.25

2.2 RESIDENTIAL MARKET DATA OVERVIEW

Table 2-5 provides summary data by market segment for major electric residential end-uses. These data points for electric HVAC and water heating equipment penetrations help quantify the energy efficiency improvement opportunities by market segment. In addition, the research also provided recent market conditions for remaining efficiency opportunities, for example: the percent of households with low-flow devices, heat pump water heaters, as well as good and/or better insulation levels. The source column provides whether the data was pulled from the online/mail-in survey versus on-site survey. Since there were many more responses from the online/mail-in survey, it was given priority where GDS had penetration data from both surveys. Characteristics shown below are based on NIPSCO electric customers only.

TABLE 2-5 SELECT RESIDENTIAL MARKET RESEARCH RESULTS FOR MAJOR ELECTRIC END-USES

Electric		Penetration		
End Use	Equipment	SF	MF	Source
Heating	Electric Heating	8.8%	34.0%	Online & Mail-in Survey (336 responses)
Cooling	Central AC	89.6%	84.6%	Online & Mail-in Survey (336 responses)
	Room AC	25.9%	18.4%	Online & Mail-in Survey (336 responses)
Water Heating	Electric Water Heating	8.9%	26.5%	On-Site Survey (65 surveys)
	Low Flow Showerheads	16.4%	67.4%	On-Site Survey (65 surveys)
Other	Refrigerator (saturation)	132.8%	112.6%	On-Site Survey (65 surveys)
	Pool Pump	3.0%	0.0%	On-Site Survey (65 surveys)
	Insulation Quality (R-20 or better)	67.7%	100.0%	On-Site Survey (65 surveys)

Table 2-6 includes the specific breakout for electric customers with electric heating, by equipment type. These proportions are tied to the Electric Heating saturations of 8.8% for SF and 34.0% for MF as shown in Table 2-5 above.

TABLE 2-6 RESIDENTIAL ELECTRIC HEATING MARKET RESEARCH RESULTS FOR NIPSCO ELECTRIC CUSTOMERS

End Use	Equipment	SF	MF	Source
Electric Heating	Electric Baseboard	0.0%	6.3%	Online & Mail-in Survey (336 responses)
	Electric Furnace	63.9%	52.2%	Online & Mail-in Survey (336 responses)
	Air Source Heat Pump	18.1%	8.2%	Online & Mail-in Survey (336 responses)
	Heat Provided by Central System in MF Building	0.0%	29.3%	Online & Mail-in Survey (336 responses)
	Don't Know	18.0%	4.0%	Online & Mail-in Survey (336 responses)

Table 2-7 provides summary data by market segment for major gas residential end-uses. Table 2-7 only contains data from customers that are NIPSCO gas customers.

TABLE 2-7 SELECT RESIDENTIAL MARKET RESEARCH RESULTS FOR MAJOR GAS END-USES

Gas		Penetration		
End Use	Equipment	SF	MF	Source
Heating	Gas Furnace Heating	89.7%	71.6%	Online & Mail-in Survey (336 responses)
	Gas Boiler Heating	4.4%	6.5%	Online & Mail-in Survey (336 responses)
	Heat Pump Heating	1.2%	0.9%	Online & Mail-in Survey (336 responses)
Water Heating	Gas Water Heating	88.3%	96.7%	On-Site Survey (65 surveys)

2.3 COMMERCIAL MARKET DATA OVERVIEW

Commercial sector market research was limited to 68 commercial facilities across the NIPSCO survey area. The market research was designed to provide high-level estimates of key electric and/or natural gas end-uses that could support broader regional estimates typically used in the C&I sector. Table 2-8 provides key electric penetration estimates for major electric end-uses. Table 2-9 provides natural gas estimates for major natural gas end-uses.

TABLE 2-8 SELECT COMMERCIAL MARKET RESEARCH RESULTS FOR MAJOR ELECTRIC END-USES

End Use	Equipment	Penetration	Source
Heating	Electric Heating	23.4%	On-Site Survey (68 surveys)
Cooling	Split System	76.1%	On-Site Survey (68 surveys)

End Use	Equipment	Penetration	Source
	PTAC	3.8%	On-Site Survey (68 surveys)
	Heat Pump	3.5%	On-Site Survey (68 surveys)
	Mini Split	2.9%	On-Site Survey (68 surveys)
	Window Unit	2.8%	On-Site Survey (68 surveys)
Water Heating	Electric Water Heating	54.9%	On-Site Survey (68 surveys)
Cooking	Electric Only	16.4%	On-Site Survey (68 surveys)

TABLE 2-9 SELECT COMMERCIAL MARKET RESEARCH RESULTS FOR MAJOR GAS END-USES

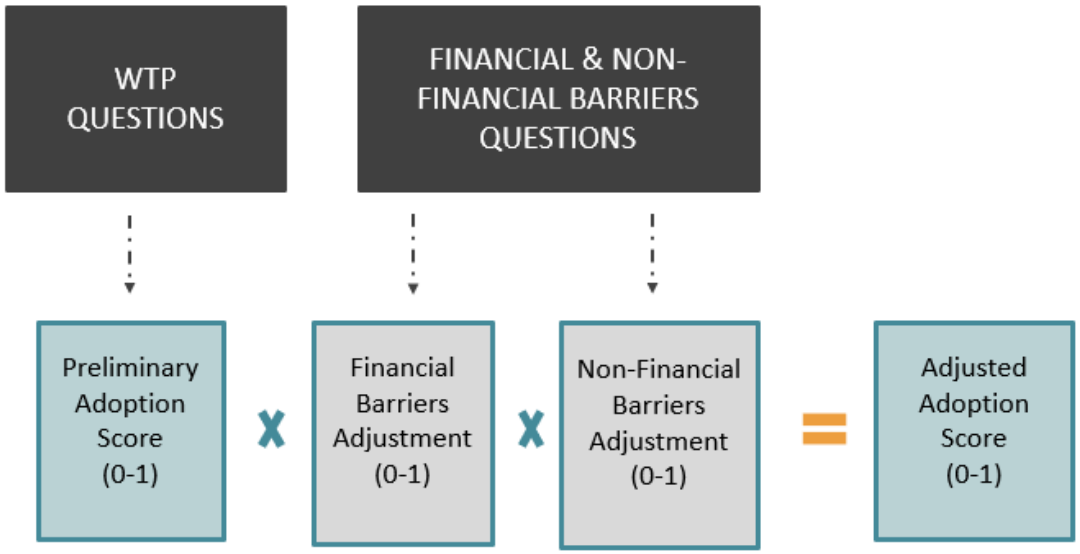
End Use	Equipment	Penetration	Source
Heating	Gas Heating	53.4%	On-Site Survey (68 surveys)
Water Heating	Gas Water Heating	16.5%	On-Site Survey (68 surveys)

2.4 WILLINGNESS TO PARTICIPATE (WTP) MARKET DATA

In addition to obtaining new primary research on building and energy-consuming equipment characteristics in the NIPSCO service area, one of the major objectives of the primary research was to survey NIPSCO customers on their future willingness to purchase and install energy efficiency technologies, in order to develop assumptions related to measure/program adoption curves and, to help inform estimates of achievable potential.

Adoption rate calculations were based on a battery of questions which assessed (1) the respondent's willingness to adopt energy efficiency technologies in scenarios with varying levels of program support and (2) the magnitude of the respondent's financial and non-financial barriers to adoption/participation. Adoption rates were calculated based on Equation 2-1, shown below.

EQUATION 2-1 WILLINGNESS TO PARTICIPATE ADOPTION SCORE FORMULA



Direct willingness-to-participate questions are the starting point of measure/program-specific adoption curve calculations. For each item, respondents were asked to rate the likelihood that they would purchase the energy efficient version of the equipment, or participate in the DR program, at various incentive levels, including no incentive and an incentive that covers the full incremental (or total) cost. Responses to financial and non-financial barrier questions were then used to adjust the preliminary adoption score.

If "cost" was a consideration in preventing customers from purchasing energy efficient equipment, GDS assumed a financial barrier adjustment. The 0% incentive level was reduced by 100%, the 25% incentive level was reduced by 80%, the 50% incentive level was reduced by 60%, the 75% incentive level was reduced by 40%, and the 100% incentive level was reduced by 20%.[3]

If another reason, besides cost, was a consideration in preventing customers from purchasing energy efficient equipment, GDS assumed a non-financial barrier adjustment. The 0% incentive level was reduced by 50%, the 25% incentive level was reduced by 40%, the 50% incentive level was reduced by 30%, the 75% incentive level was reduced by 20%, and the 100% incentive level was reduced by 10%.

2.4.1 Residential Sector Final Adoption Scores

Table 2-10 presents the preliminary and final adoption scores (after financial and non-financial adjustments) based on responses by residential homeowners. As shown in the table, residential survey respondents were asked about their willingness to purchase and install energy efficient equipment across several incentive levels and for three types of equipment found in most homes: a general appliance (refrigerator), improved insulation, and an HVAC system.

TABLE 2-10 RESIDENTIAL LONG-TERM ADOPTION SCORES BY INCENTIVE LEVEL

End Use	0% Incentive	25% Incentive	50% Incentive	75% Incentive	100% Incentive
Before Awareness Adjustment					
Refrigeration	25.3%	43.2%	78.8%	78.8%	97.5%
Insulation	14.3%	48.3%	72.0%	72.0%	97.8%
HVAC	23.0%	57.3%	76.8%	76.8%	96.7%

2.4.2 Commercial Sector Final Adoption Scores

Table 2-11 presents the preliminary and final long-term adoption scores (after financial and non-financial adjustments) based on responses by commercial property managers. In contrast to the residential sector, commercial property managers were asked about their willingness to purchase and install energy efficient equipment according to different expected payback levels and two initial investment levels (major vs. minor).

TABLE 2-11 COMMERCIAL LONG-TERM ADOPTION SCORES BY INCENTIVE LEVEL

[3] The financial and non-financial barrier adjustment factors were both made on a stepwise scale because the barrier to choosing the efficient option is lessened as more of the incremental cost is covered. The adjustment for financial barriers is greater than for non-financial barriers because there is more of a contradiction between WTP and barrier responses. For example, it would be a contradiction if a respondent indicated that a financial barrier was a significant barrier to the adoption of the energy efficient option, but then also said they would adopt the energy efficient option without an incentive.

	10 Year Payback Period	5 Year Payback Period	3 Year Payback Period	1 Year Payback Period	0 Year Payback Period
Before Awareness Adjustment					
Major Investment	42.8%	58.1%	67.6%	74.6%	81.2%
Minor Investment	41.0%	56.1%	65.7%	73.1%	80.8%

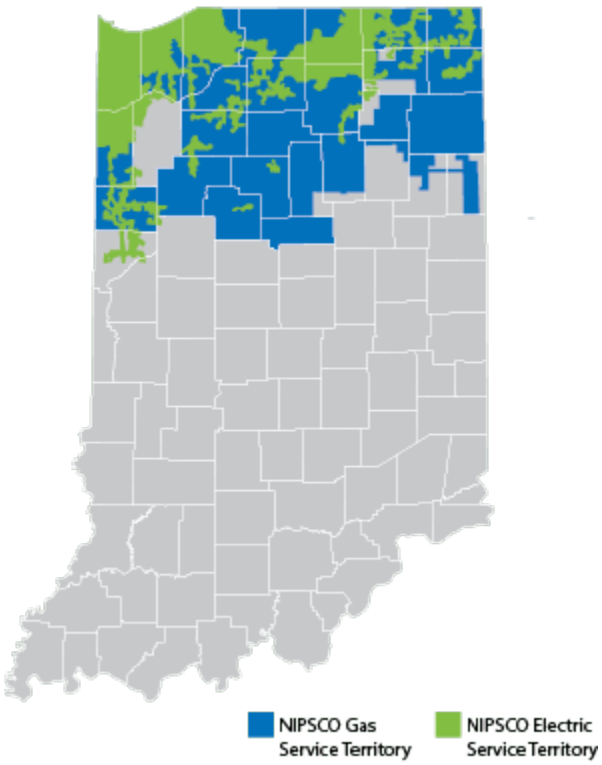
3 Sales Forecast and Market Segmentation

Developing a market characterization in the context of utility natural gas consumption among each sector is a key foundational element to market potential studies. A market characterization describes how gas is used among the various end-uses and building types that are the subject of the potential study. This section provides a brief overview of the sales and customer forecasts for NIPSCO's gas customers. It also includes a more detailed breakdown of the end-use and building type consumption, along with an overview of how these segmentations were developed.

3.1 NIPSCO COMPANY SERVICE AREA

This study assessed the gas energy efficiency potential for NIPSCO. Figure 3-1 identifies the overall NIPSCO territory, for both gas and electric, relative to the geographic area of Indiana.

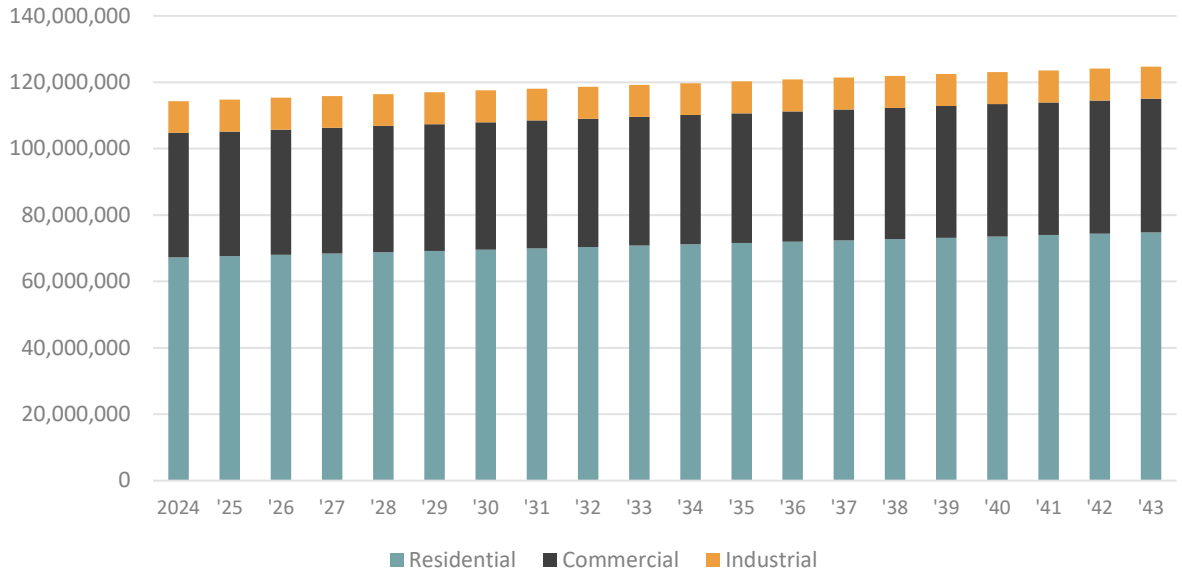
FIGURE 3-1 NIPSCO SERVICE TERRITORY MAP



3.2 LOAD FORECASTS

Figure 3-2 provides the gas sales by eligible sector used in the MPS across the 2024-2043 timeframe. Sales are forecasted to gradually increase from 114 million MMBtu to nearly 125 million MMBtu from 2024 to 2043. The sales figure does not include large gas transportation customers and other ineligible sales from customers not eligible to participate in NIPSCO's gas energy efficiency programs.

FIGURE 3-2 20-YEAR GAS SALES (MMBTU) FORECAST BY SECTOR

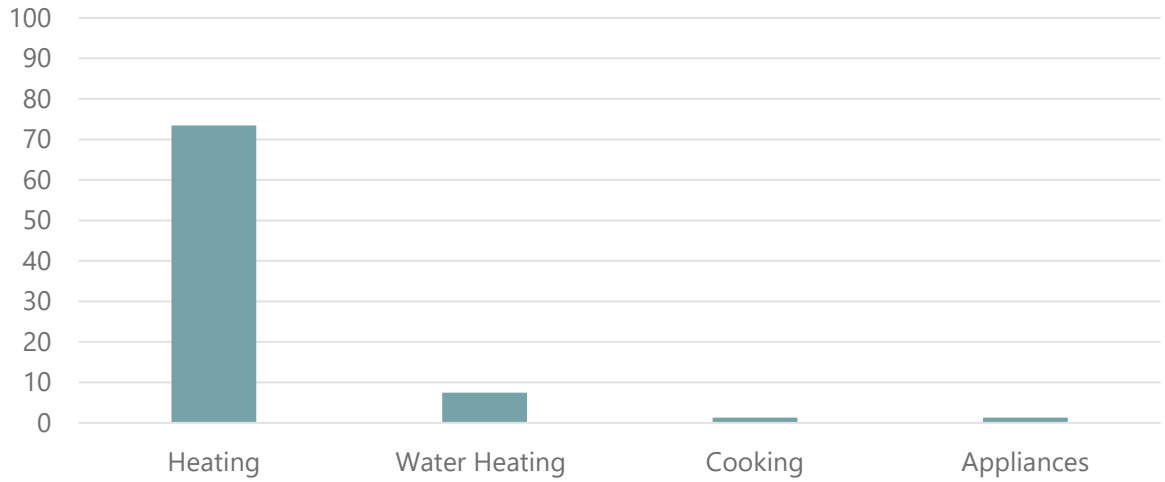


3.3 SECTOR LOAD DETAIL

3.3.1 Residential Sector

The residential natural gas calibration effort led to an end-use intensity breakdown as shown below in Figure 3-3. Overall, GDS estimated per home consumption to be 84 MMBtu per year. Heating accounts for 88% of total estimated usage, followed by water heating at 9%. Cooking and appliances account for 3% of estimated usage.

FIGURE 3-3 RESIDENTIAL NATRUAL GAS END-USE BREAKDOWN



3.3.2 Commercial & Industrial Sectors

In the C&I sector, disaggregated forecast data provides the foundation for the development of energy efficiency potential estimates. SIC information from NIPSCO's database of eligible natural gas customers, along with EIA Commercial Building Energy Consumption (CBECS) building type consumption tables, was then used to segment the forecast into end-uses by building type. Figure 3-4 provides a breakdown of commercial gas sales by building type. Offices (40%), followed by Retail (12%), Education (11%), and Other (10%), are the leading contributors of stand-alone building types to total commercial gas sales.

FIGURE 3-4 COMMERCIAL GAS SALES BREAKDOWN BY BUILDING TYPE[4]

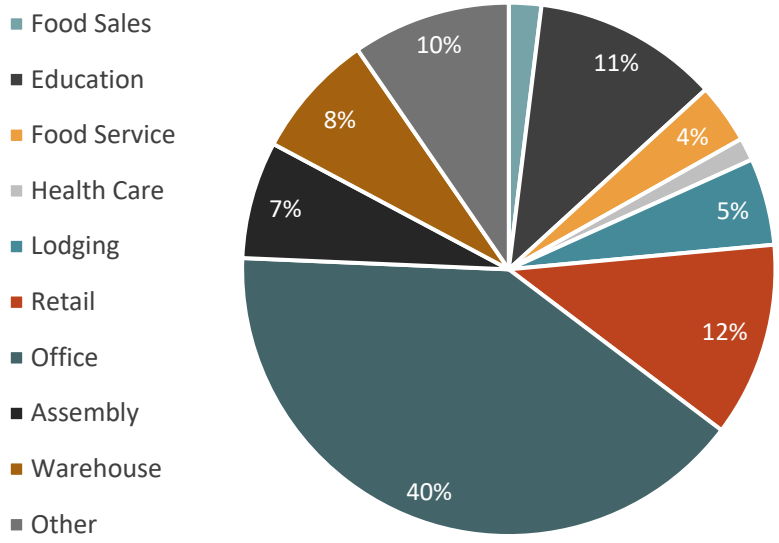


Figure 3-5 provides an illustration of the leading end-uses across all building types in the commercial sector. As expected, Space Heating is the dominant end-use across most commercial building types. Cooking is a significant end-use for food sales and food service. Water Heating and Pools are the dominant gas uses for Lodging.

FIGURE 3-5 COMMERCIAL GAS END-USE BREAKDOWN BY BUILDING TYPE

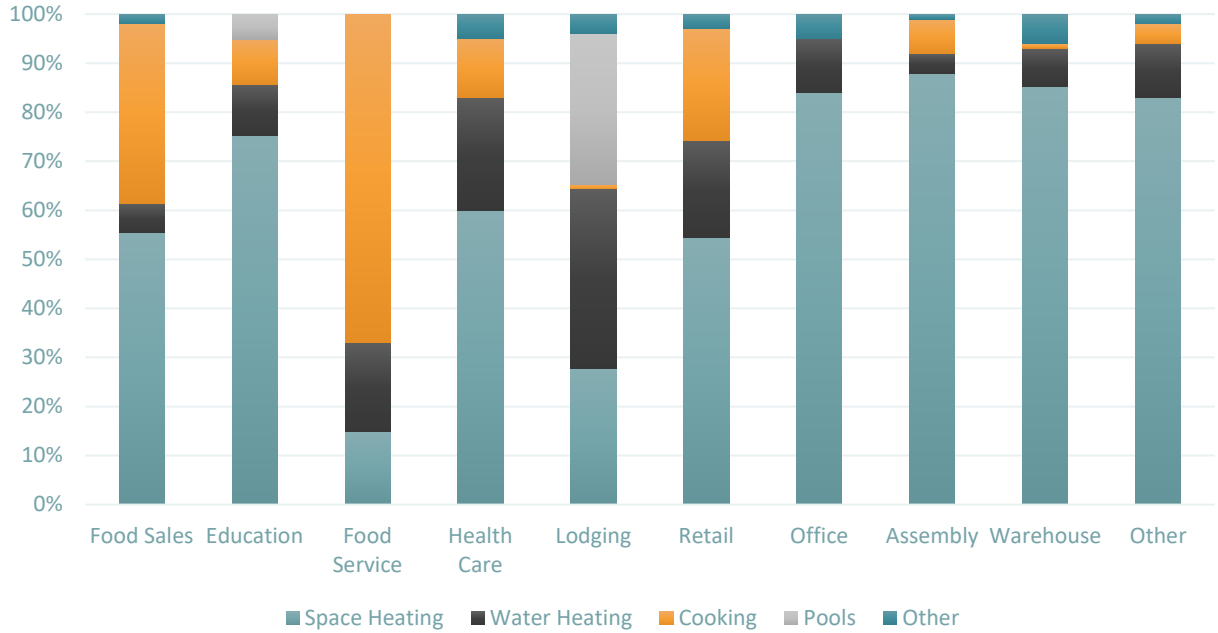
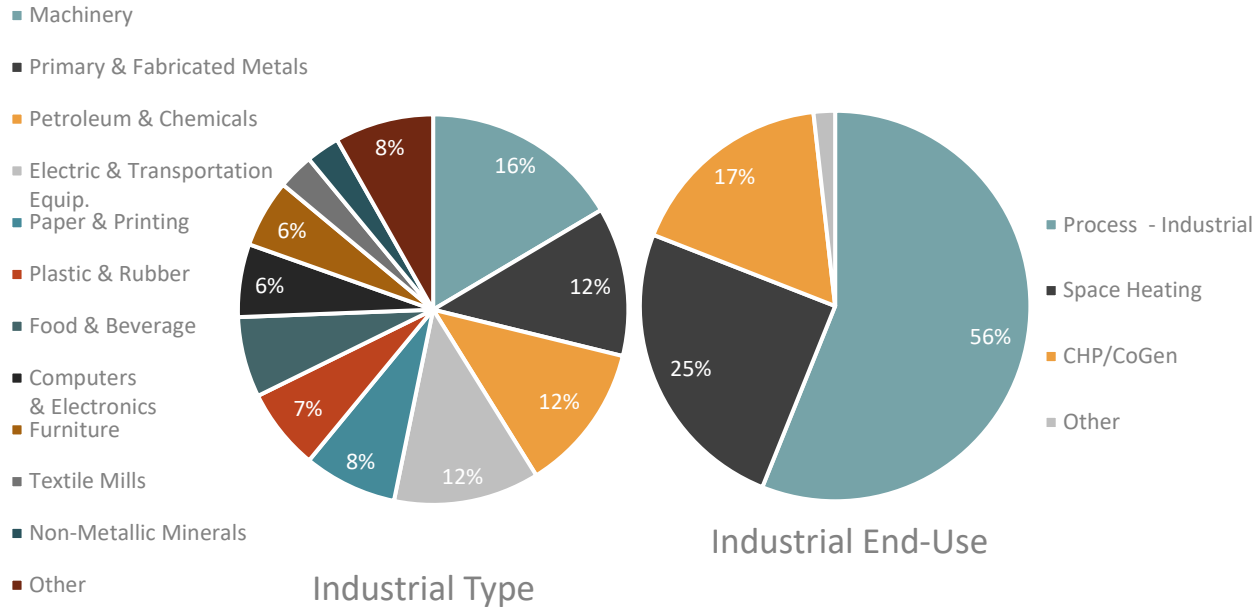


Figure 3-6 depicts industrial segments that are eligible to participate in NIPSCO's gas energy efficiency programs, broken down by both industry type (left pie chart) and end-use (right pie chart). Machinery,

[4] Data labels for commercial building types with < 2% of total commercial gas sales excluded for presentation purposes.

Primary & Fabricated Metals, Petroleum & Chemicals, and Electric & Transportation Equipment were the leading industry types according to SIC code. Industrial Process accounts for the dominant share of industrial sales, followed by Space Heating, and CHP/Cogeneration.

FIGURE 3-6 INDUSTRIAL SECTOR GAS SALES BREAKDOWN BY INDUSTRY TYPE AND END-USE[5]



[5] Missing values reflect industry type/end-uses with < 3% of total industrial sales.

4 Market Potential Study Methodology

This section describes the overall methodology utilized to assess the natural gas energy efficiency potential in the NIPSCO service area. The main objectives of this Market Potential Study ("MPS") were to estimate the technical, economic, maximum achievable potential ("MAP"), and realistic achievable potential ("RAP") savings from energy efficiency in the NIPSCO service territory; and to quantify these estimates of potential in terms of MMBtu savings, for each level of energy efficiency potential.

4.1 OVERVIEW OF APPROACH

For the residential sector, GDS took a bottom-up approach to the modeling, whereby measure-level estimates of costs, savings, and useful lives were used as the basis for developing the technical, economic, and achievable potential estimates. The measure data was used to build-up the technical potential, by applying the data to each relevant market segment. Measure data was also used for benefit-cost screening to assess economic potential, which was in turn used as the basis for achievable potential. For the C&I sectors, GDS took a bottom-up modeling approach to first estimate measure-level savings and costs, as well as cost-effectiveness, and then applied cost-effective measure savings to all applicable shares of energy load. Further details of the market research and modeling techniques utilized in this assessment are provided in the following sections.

4.2 MARKET CHARACTERIZATION

The initial step in the analysis was to gather a clear understanding of the current market segments in the NIPSCO service area. The GDS team coordinated with NIPSCO to gather utility sales, customer data and existing market research, in order to define appropriate market sectors, market segments, vintages, saturation data and end uses. This information served as the basis for completing a forecast disaggregation and market characterization of both the residential and nonresidential sectors.

4.2.1 Forecast Disaggregation

As noted in Chapter 3, through the development of the baseline forecasts, GDS produced disaggregated forecasts by sector and end-use. The produced baseline forecasts were disaggregated by sector and then further segmented as follows:

- ***Residential.*** The residential forecast was broken out by housing type, between existing income qualified and market-rate customers, as well as new construction.
- ***Commercial.*** Typically based on major EIA CBECS business types: retail, warehouse, food sales, office, lodging, health, food service, education, and miscellaneous.
- ***Industrial.*** As determined by actual load consumption shares and major industry types defined by EIA's Manufacturing Energy Consumption Survey (MECS) data.

The segmentation analysis was performed by applying NIPSCO-specific segment and end-use consumption shares, derived from NISPCO's customer database and SIC code analysis (building segmentation), and by EIA CBECS and MECS data (end-use segmentation), to forecast sales. Within the residential, commercial and industrial market segments, the produced forecasts were segmented by the major end uses shown in Table 4-1.

TABLE 4-1: NATURAL GAS END-USE LOADS

Residential	C&I	
	Commercial	Industrial
Heating	Space Heating	Space Heating
Water Heating	Water Heating	Industrial-Process
Clothes Washer	Cooking	Other
Clothes Dryer	Pools	
Pools	Other	
Miscellaneous		

4.2.2 Building Stock/Equipment Saturation

To assess the potential natural gas energy efficiency savings available, estimates of the current saturation of baseline equipment and energy efficiency measures are necessary.

4.2.2.1 Residential Sector

For the residential sector, GDS relied on several primary research efforts. The most important effort was a 2019 online/mail survey of NIPSCO customers, conducted by the GDS Team as part of the study. More than 200 responses provided a strong basis for many of the NIPSCO measure baseline and efficient saturation estimates. GDS also relied on an onsite survey of NIPSCO customers, conducted by the GDS Team in 2019. This study helped fill in data gaps and confirmed the results of the online survey.

Other data sources included ENERGY STAR unit shipment data, NIPSCO evaluation reports, EIA Residential Energy Consumption Survey data from 2015 and baseline studies from other states. The ENERGY STAR unit shipment data filled data gaps related to the increased saturation of energy efficient equipment across the U.S. in the last decade.

4.2.2.2 C&I Sector

For the commercial sector, building stock and equipment saturation data was informed from a combination of primary market research (on-site surveys noted in Section 2.3), as well as other available regional or national data. Beyond the primary data collection, EIA regional data as well as national studies on commercial energy consumption were used to inform consumption in the remaining end-uses, where data from the primary market research was even more limited.[6]

GDS did not collect any primary market research in the industrial sector due to the high prevalence of eligible opt-out customers. GDS relied on secondary research, including the EIA Manufacturing Energy Consumption Survey, for assessing the efficiency saturation of the remaining measures for industrial gas equipment.

4.2.3 Remaining Factor

The remaining factor is the proportion of a given market segment that is not yet efficient and can still be converted to an efficient alternative. It is the inverse of the saturation of an energy efficient measure, prior to any adjustments. For this study, we made two key adjustments to recognize that the energy efficient saturation does not necessarily always fully represent the state of market transformation. In other words, while a percentage of installed measures may already be efficient, this does not preclude

[6] Examples of secondary research include: Energy Savings Potential RD&D Opportunities for Commercial Building Appliances. 2016. DOE and Energy Star Shipment Data.

customers from backsliding, or reverting to standard technologies, or otherwise less efficient alternatives in the future, based on considerations like measure cost and availability and customer preferences.

For measures categorized as market opportunity (i.e., replace-on-burnout), we assumed that in 50% of the instances in which an efficient measure is already installed, the burnout or failure of those measures would be eligible for inclusion in the estimate of future savings potential. Essentially, this adjustment implies that we are assuming that 50% of the market is transformed, and no future savings potential exists, whereas the remaining 50% of the market is not transformed and could backslide without the intervention of an NIPSCO program and an incentive. Similarly, for retrofit measures, we assumed that in only 10% of the instances in which an efficient measure is already installed, the burnout or failure of those measures would be eligible for inclusion in the estimate of future savings potential. This recognizes the more proactive nature of retrofit measures, as the implementation of these measures are more likely to be elective in nature, compared to market opportunity measures, which are more likely to be needs-based. We recognize the uncertainty in these assumptions, but we believe them to be appropriate , as they recognize a key component of the nature of customer decision making.

4.3 MEASURE CHARACTERIZATION

4.3.1 Measure Lists

The study's sector-level energy efficiency measure lists were informed by a range of sources including the Indiana TRM, current NIPSCO program offerings, and commercially viable emerging technologies, among others. Measure list development was a collaborative effort in which GDS developed draft lists that were shared with NIPSCO and stakeholders. The final measure lists ultimately included in the study reflected the informed comments and considerations from the parties that participated in the measure list review process.

In total, GDS analyzed 199 measure types for NIPSCO. Many measures were included in the study as multiple permutations to account for different specific market segments, such as different building types, efficiency levels, and replacement options. GDS developed a total of 3,060 measure permutations for this study. Each permutation was screened for cost-effectiveness according to the UCT. The parameters for cost-effectiveness under the UCT are discussed in detail later in Section 4.4.3.

TABLE 4-2 NUMBER OF NATURAL GAS MEASURES EVALUATED

	# of Measures	Total # of Measure Permutations
NIPSCO – Gas		
Residential	79	388
Commercial	62	1860
Industrial	58	812
Total	***199***	***3060***

4.3.2 Emerging Technologies

GDS considered several specific emerging technologies as part of analyzing future potential. These consist of several smart technologies, including smart appliances, smart water heater (WH) tank controls, smart window coverings, smart ceiling fans, and home automation/home energy management systems. While this is likely not an exhaustive list of possible emerging technologies over the next twenty years, it does consider many of the known technologies that are available today but may not yet have widespread market acceptance and/or product availability.

In addition to these specific technologies, GDS acknowledges that there could be future opportunities for new technologies as equipment standards improve and market trends occur. While this analysis does not make any explicit assumption about unknown future technologies, the methodology assumes that subsequent equipment replacement that occurs over the course of the 20-year study timeframe, and at the end of the initial equipment's useful life, will continue to achieve similar levels of energy savings, relative to improved baselines, at similar incremental costs.

4.3.3 Assumptions & Sources

A significant amount of data is needed to estimate the natural gas savings potential for individual energy efficiency measures or programs across the residential and nonresidential customer sectors. GDS utilized data specific to NIPSCO when it was available and current. GDS used the most recent NIPSCO evaluation report findings (as well as NIPSCO program planning documents), the 2015 Indiana Technical Reference Manual (TRM), the Illinois TRM, and the Michigan Energy Measures Database (MEMD) to inform a large amount of the data requirements. Additional data sources were only used if these sources either did not address a certain measure or contained outdated information. Building energy simulation modeling results formed the basis for most residential heating end use measure savings. The National Renewable Energy Laboratory (NREL) Energy Measures Database also served as a key data source in developing measure cost estimates. Additional source documents included American Council for an Energy-Efficient Economy (ACEEE) research reports, covering topics like emerging technologies.

Measure Savings: GDS relied on existing NIPSCO evaluation report findings and the 2015 IN TRM to inform calculations supporting estimates of annual measure savings as a percentage of base equipment usage. For custom measures and measures not included in the IN TRM, GDS estimated savings from a variety of sources, including:

- Illinois TRM, MEMD, and other regional/state TRMs
- Building energy simulation software (BEopt) and engineering analyses
- Secondary sources such as the ACEEE, Department of Energy (DOE), EIA, ENERGY STAR©, and other technical potential studies

Measure Costs: Measure costs represent either incremental or full costs. These costs typically include the incremental cost of measure installation, when appropriate, based on the measure definition. For purposes of this study, nominal measure costs held constant over time.[7]

GDS obtained measure cost estimates primarily from the NIPSCO program planning databases and the 2015 IN TRM. GDS used the following data sources to supplement the IN TRM:

- Illinois TRM, MEMD, and other regional/state TRMs
- Secondary sources such as the ACEEE, ENERGY STAR, and NREL
- Program evaluation and market assessment reports completed for utilities in other states

Costs and savings for new construction and replace on burnout measures were calculated as the incremental difference between the code minimum equipment and the energy efficiency measure. This approach was utilized because the consumer must select an efficiency level that is at least the code minimum equipment when purchasing new equipment. The incremental cost is calculated as the difference between the cost of high efficiency and standard efficiency (code compliant) equipment.

[7] GDS had previously reviewed the deemed measure cost assumptions included in the Illinois TRM from 2012 (v1) through 2018 (v7). Where a direct comparison of cost was applicable, GDS found no change in measure cost across 80% of residential and nonresidential measures. In a similar search of the MEMD from 2011 to 2018, GDS again found that most of incremental measure costs in 2018 were either the same or higher than the recorded incremental measure cost in 2011.

However, for retrofit or direct install measures, the measure cost was the "full" cost of the measure, as the baseline scenario assumes the consumer would not make energy efficiency improvements in the absence of a program. In general, the savings for retrofit measures are calculated as the difference between the energy use of the removed equipment and the energy use of the new high efficiency equipment (until the removed equipment would have reached the end of its useful life).

Measure Life: Measure life represents the number of years that energy using equipment is expected to operate. GDS obtained measure life estimates from the 2015 IN TRM and NIPSCO program planning databases, and used the following data sources for measures not in the IN TRM:

- Illinois TRM, MEMD, and other regional/state TRMs
- Manufacturer data
- Savings calculators and life-cycle cost analyses

All measure savings, costs, and useful life assumption sources are documented in the Appendices volume of this report.

4.3.4 Treatment of Codes & Standards

By law, the U.S. Department of Energy (DOE) is expected to review each national appliance standard every six years and publish either a proposed rule to update the standard or determine that no change to the existing standard is needed. As of March 2021, DOE has missed legal deadlines for twenty-eight product standards since 2016.[8] Given these delays in future standard updates, the initial start year of 2024 for this analysis, and that the analysis is not intended to predict how or when energy codes and standards will change over time, there are only limited known improvements to federal codes and standards to reasonably account for in this analysis.

4.3.5 Net to Gross (NTG)

All estimates of technical, economic, and achievable potential, as well as measure level cost-effectiveness screening were conducted in terms of gross savings to reflect the absence of program design considerations in these phases of the analysis.

4.4 ENERGY EFFICIENCY POTENTIAL

This section reviews the types of potential analyzed in this report, as well as some key methodological considerations in the development of technical, economic, and achievable potential.

4.4.1 Types of Potential

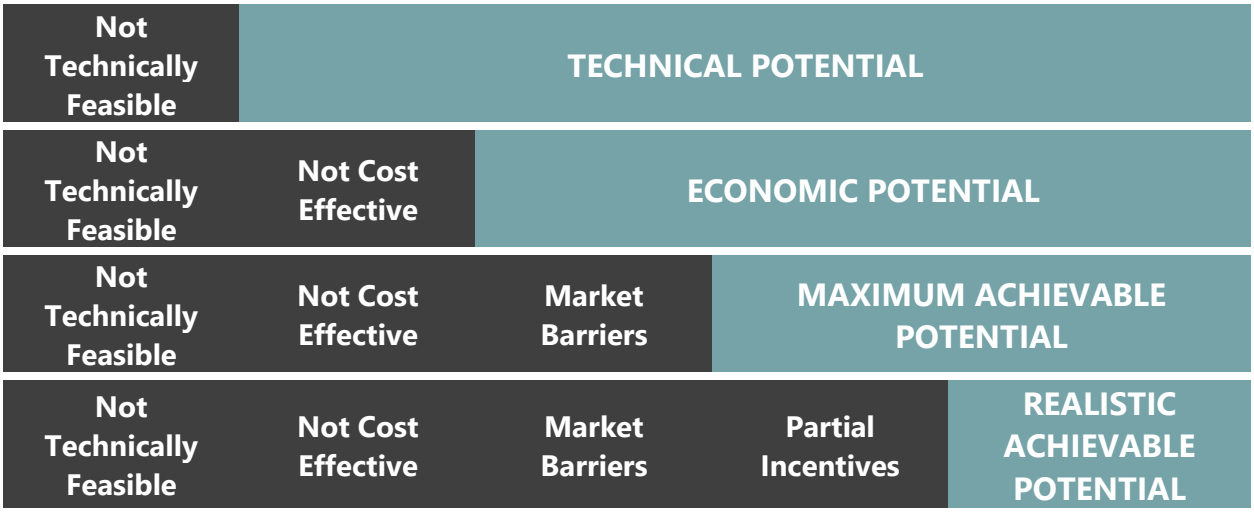
Potential studies often distinguish between several types of energy efficiency potential: technical, economic, and achievable potential. However, because there are often important definitional issues between studies, it is important to understand the definition and scope of each potential estimate as it applies to this analysis.

The first two types of potential, technical and economic, provide a theoretical upper bound for energy savings from energy efficiency measures. Still, even the best-designed portfolio of programs is unlikely to capture 100% of the technical or economic potential. Therefore, achievable potential attempts to estimate what savings may realistically be achieved through market interventions, when those savings

[8] Missed Deadlines for Appliance Standards. Prepared by the Appliance Standards Awareness Project. Updated March 2021.

can be captured, and how much it would cost to do so. Figure 3-2 illustrates the types of energy efficiency potential considered in this analysis.

FIGURE 3-2 TYPE OF ENERGY EFFICIENCY POTENTIAL



4.4.2 Technical Potential

Technical potential is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints, such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. Under technical potential, GDS assumed that 100% of new construction and market opportunity measures are adopted, as those opportunities become available (e.g., as new buildings are constructed, they immediately adopt efficiency measures, or as existing measures reach the end of their useful life). For retrofit measures, implementation was assumed to be resource constrained and it was assumed that it was not possible to install all retrofit measures at once. Rather, retrofit opportunities were assumed to be replaced incrementally until 100% of stock was converted to the efficient measure over a period of no more than 15 years.

The core equation used in the residential sector energy efficiency technical potential analysis for each individual efficiency measure is shown in Equation 4-1 below. The business (C&I) sector employs a similar analytical approach.

EQUATION 4-1 CORE EQUATION FOR RESIDENTIAL SECTOR TECHNICAL POTENTIAL

$$\text{TECHNICAL POTENTIAL OF EFFICIENT MEASURES} = \text{Total Number of Households} \times \text{Base Case End Use Intensity (kWh/unit)} \times \text{Saturation Share} \times \text{Remaining Factor} \times \text{Feasibility Factor} \times \text{Savings Factor}$$

Where…

Base Case Equipment End-Use Intensity = the natural gas used per customer per year by each base-case technology in each market segment. In other words, the base case equipment end-use intensity is the consumption of the natural gas using equipment that the efficient technology replaces or affects.

Saturation Share = the fraction of the end-use natural gas energy that is applicable for the efficient technology in a given market segment. For example, for residential water heating, the saturation share would be the fraction of all residential natural gas customers that have natural gas water heating in their household.

Remaining Factor = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the fraction of natural gas water heaters that is not already energy efficient.

Feasibility Factor = (also functions as the applicability factor) the fraction of the applicable units that is technically feasible for conversion to the most efficient available technology, from an engineering perspective.

Savings Factor = the percentage reduction in natural gas consumption resulting from the application of the efficient technology.

4.4.2.1 Competing Measures & Interactive Effects Adjustments

GDS prevents double-counting of savings, and accounts for competing measures and interactive savings effects, through three primary adjustment factors:

Baseline Saturation Adjustment. Competing measure shares may be factored into the baseline saturation estimates. For example, nearly all homes can receive insulation, but the analysis has created multiple measure permutations to account for varying impacts of different heating/cooling combinations and has applied baseline saturations to reflect proportions of households with each heating type combination.

Applicability Factor Adjustment. Combined measures into measure groups, where total applicability factor across measures is set to 100%. For example, homes cannot receive a programmable thermostat, connected thermostat, and smart thermostat. In general, the models assign the measure with the most savings the greatest applicability factor in the measure group, with competing measures picking up any remaining share.

Interactive Savings Adjustment. As savings are introduced from select measures, the per-unit savings from other measures need to be adjusted (downward) to avoid over-counting. The analysis typically prioritizes market opportunity equipment measures (versus retrofit measures that can be installed at any time). For example, the savings from a smart thermostat are adjusted down to reflect the efficiency gains of installing an efficient natural gas furnace. The analysis also prioritizes efficiency measures relative to conservation (behavioral) measures.

4.4.3 Economic Potential

Economic potential refers to the subset of the technical potential that is economically cost-effective (based on screening with the UCT) as compared to conventional supply-side energy resources.

4.4.3.1 Utility Cost Test & Incentive Levels

The economic potential assessment included a screen for cost-effectiveness using the UCT at the measure level. In the NIPSCO territory, the UCT considers natural gas energy as a benefit, and utility incentives and direct install equipment expenses as costs. Consistent with application of economic potential, according to the National Action Plan for Energy Efficiency, the measure level economic screening does not consider non-incentive/measure delivery costs (e.g., admin, marketing, evaluation etc.) in determining cost-effectiveness.[9]

Apart from the low-income segment of the residential sector, all measures were required to have a UCT benefit-cost ratio greater than 1.0 to be included in economic potential and all subsequent estimates of energy efficiency potential. Low-income measures were not required to be cost-effective; all low-income specific measures are included in the economic and achievable potential estimates.

[9] National Action Plan for Energy Efficiency: Understanding Cost-Effectiveness of Energy Efficiency Programs. *Note: Non-incentive delivery costs are included in the assessment of achievable potential.*

For both the calculation of the measure-level UCT, as well as the determination of RAP, historical incentive levels (as a % of incremental measure cost) were calculated for current measure offerings. GDS relied on NIPSCO's DSM Portfolio Summary to map current measure offerings to their historical incentive levels. For study measures that did not map directly to a current offering, GDS used an average incentive of 35% in the residential sector. In the C&I sector, all non-current prescriptive incentive offerings were calculated using the assumed custom incentive, which is offered as a $10/first-year MMBtu saved. These incentive levels were informed, based on discussions with NIPSCO staff, to align with current or expected near-future offer levels:

- Residential Home Rebate and Marketplace measures averaged incentives of 18% and 24% of the measure cost.
- Behavioral, IQW, and School Education measures averaged 90-100% of the measure cost.
- Low income and direct install measures received incentives equal to 100% of the measure cost.
- In the non-residential sector, prescriptive incentives averaged 50% of the measure cost. SBDI program measures averaged nearly 60% of the assumed measure cost.
- In the MAP scenario, all incentives were set to 100% of the incremental measure cost.

4.4.3.2 Avoided Costs

Avoided cost values for natural gas energy were provided by NIPSCO as part of an initial data request. Natural gas avoided cost values are based on an annual wholesale cost. For years outside of the avoided cost forecast timeframe, future year avoided costs are escalated by the rate of inflation.

4.4.4 Achievable Potential

Achievable potential is the amount of energy that can realistically be saved given various market barriers. Achievable potential considers real-world barriers to encouraging end users to adopt efficiency measures; the non-measure costs of delivering programs (for administration, marketing, analysis, and EM&V); and the capability of programs and administrators to boost program activity over time. Barriers include financial constraints, customer awareness and WTP in programs, technical constraints, and other barriers that the "program intervention" is modeled to overcome. Additional considerations include political and/or regulatory constraints. The potential study evaluated two achievable potential scenarios:

- ***MAP***, or maximum achievable potential, estimates achievable potential with NIPSCO paying incentives equal to 100% of measure incremental costs and aggressive adoption rates.
- ***RAP***, or realistic achievable potential, estimates achievable potential with NIPSCO paying incentive levels (as a percent of incremental measure costs) closely calibrated to historical levels, but is not constrained by any previously determined spending levels.

4.4.4.1 Market Adoption Rates

GDS assessed achievable potential on a measure-by-measure basis. In addition to accounting for the natural replacement cycle of equipment in the achievable potential scenario, GDS estimated measure specific maximum adoption rates that reflect the presence of possible market barriers and associated difficulties in achieving the 100% market adoption assumed in the technical and economic scenarios.

The initial step in this analysis was to assess the long-term market adoption potential for energy efficiency technologies. Due to the wide variety of measures across multiple end-uses, GDS employed varied measure and end-use-specific ultimate adoption rates, versus a singular universal market adoption curve. These long-term market adoption estimates were based on either NIPSCO-specific WTP market research or publicly available DSM research, including market adoption rate surveys and other utility program benchmarking. These surveys included questions to residential homeowners and nonresidential facility managers regarding their perceived willingness to purchase and install energy efficient technologies across various end uses and incentive levels and are discussed in additional detail in Section 2.4.

One caveat to this approach is that the WTP adoption score is generally a simple function of incentive levels and payback. There are other factors that may influence a customer's willingness to purchase an energy efficiency measure. For example, increased marketing and education programs can have a critical impact on the success of energy efficiency programs. To reflect market barriers beyond total and up-front costs, GDS also included a program awareness factor into the determination of the long-term adoption rate. The adoption rate was based on the WTP survey research, as well as other market research conducted by NIPSCO,related to customer engagement and awareness of energy efficiency programs. The program awareness for the realistic achievable potential ranged from 60-76% and was increased in the maximum achievable scenario (85%) to reflect the likelihood of increased program awareness under more aggressive program delivery strategies. Although we recognize that this approach does not capture every possible factor in determining appropriate long-term adoption levels, it does assign some weight to non-financial considerations in the assessment of long-term energy efficiency potential.

GDS utilized likelihood and willingness-to-participate data to estimate the long-term market adoption potential for both the maximum and realistic achievable scenarios.[10] Table 4-2 presents the long-term market adoption rates at varied incentive levels for the residential sector. Most end-uses are based on the WTP primary market research. Behavior was set to 100% to reflect that the program design is typically opt-out and participation levels are dictated by the utility. Awareness factors for these programs were also modified accordingly.

TABLE 4-2 RESIDENTIAL LONG-TERM MARKET ADOPTION RATES AT DISCRETE INCENTIVE LEVELS

End Use	0% Incentive	25% Incentive	50% Incentive	75% Incentive	100% Incentive	RAP Awareness	MAP Awareness
Appliances/ Water Heat/ Pools	25.3%	43.2%	78.8%	78.8%	97.5%	60%	85%
Insulation/ Audits/ New Const.	14.3%	48.3%	72.0%	72.0%	97.8%	60%	85%
HVAC	23.0%	57.3%	76.8%	76.8%	96.7%	60%	85%
Behavior	8.6%	17.2%	29.0%	43.2%	58.7%	100%	100%

Table 4-3 presents the long-term market adoption rates used in the nonresidential sector. Again, the adoption scores were primarily informed by NIPSCO-specific WTP research. To reflect differences in delivery strategy, varying awareness factors were created for different C&I program offerings based on available market data collected by NIPSCO and assumptions about trade ally involvement and impact on future adoption rates.

TABLE 4-3 NONRESIDENTIAL LONG-TERM MARKET ADOPTION RATES AT DISCRETE PAYBACK INTERVALS

[10] For the MAP Scenario, the long-term adoption rate was reached by Year15 (or earlier) and annual participation remained flat in the final five years of the analysis. In the RAP scenario, the analysis assumes the maximum adoption rate is reached over a period of 20-years or less.

	10 Year Payback Period	5 Year Payback Period	3 Year Payback Period	1 Year Payback Period	0 Year Payback Period
Major Investment	42.8%	58.1%	67.6%	74.6%	81.2%
Minor Investment	41.0%	56.1%	65.7%	73.1%	80.8%

	Prescriptive	Custom	SBDI	Lighting	MAP
Awareness Factor	67%	76.3%	56.0%	85%	85%%

In the maximum achievable potential scenario, incentives were assumed to represent 100% of the measure cost (0-year payback) and awareness factor was set at a minimum of 85%.

GDS then estimated initial year adoption rates by reviewing the current saturation levels of efficient technologies and (if necessary) calibrating the estimates of 2024 annual potential to recent historical levels achieved by NIPSCO's current DSM portfolio. This calibration effort ensures that the forecasted achievable potential in 2024 is realistic and attainable. GDS then assumed a non-linear ramp rate from the initial year market adoption rate to the various long-term market adoption rates for each specific end-use.

4.4.4.2 Non-Incentive Costs

Consistent with National Action Plan for Energy Efficiency (NAPEE) guidelines[11], utility non-incentive costs were included in the overall assessment of cost-effectiveness at the RAP scenario. 2024 direct measure/program non-incentive costs were calibrated to recent projected levels (using NIPSCO's 2022-2023 DSM Plan) and set at:

- $6.723 per first year MMBtu saved for the Home Rebates Program
- $8.053 per first year MMBtu saved for the Home Energy Analysis Program
- $7.262 per first year MMBtu saved for the School Education Program
- $6.988 per first year MMBtu saved for the Multifamily Direct Install Program
- $4.159 per first year MMBtu saved for the Behavioral Program
- $6.559 per first year MMBtu saved for the New Construction Program
- $7.223 per first year MMBtu saved for the Home Life EE Calculator Program
- $11.36 per first year MMBtu saved for the Income Qualified Weatherization Program
- $6.102 per first year MMBtu saved for the Marketplace Program
- $4.70 per first year MMBtu saved for all commercial gas measures

Non-incentive costs were then escalated annually at the rate of inflation.

[11] National Action Plan for Energy Efficiency (2007). Guide for Conducting Energy Efficiency Potential Studies. Prepared by Optimal Energy. This study notes that economic potential only considers the cost of efficiency measures themselves, ignoring programmatic costs. Conversely, achievable potential should consider the non-measures costs of delivering programs. Pg. 2-4.

5 Residential Energy Efficiency Potential

This section provides the potential results for technical, economic, MAP and RAP for the residential sector. The cost-effectiveness results and budgets for the RAP scenario are also provided.

5.1 SCOPE OF MEASURES & END USES ANALYZED

There were 79 total unique natural gas measures included in the analysis. Table 5-1 provides the number of measures by end-use and fuel type (the full list of residential measures is provided in the appendices volume of this report). The measure list was developed based on a review of current NIPSCO programs, the Indiana TRM, other regional TRMs, and industry documents related to emerging technologies. Data collection activities to characterize measures formed the basis of the assessment of incremental costs, natural gas savings, and measure life.

TABLE 5-1 RESIDENTIAL ENERGY EFFICIENCY MEASURES – BY END USE

End-Use	Number of Unique Measures
Appliance	9
Audit	4
Behavioral	3
HVAC Equipment	15
HVAC Shell	12
New Construction	6
Pools	2
Water Heating	28

5.2 RESIDENTIAL NATURAL GAS POTENTIAL SAVINGS

Figure 5-1 provides the technical, economic, MAP and RAP results for the 3-year, 10-year, and 20-year timeframes. The 3-year technical potential is 11.9% of forecasted sales, while the economic potential is 9.3% of forecasted sales. The 3-year MAP is 3.4% and the RAP is 2.1%.

FIGURE 5-1 RESIDENTIAL NATURAL GAS ENERGY CUMULATIVE ANNUAL POTENTIAL (% OF SECTOR SALES)

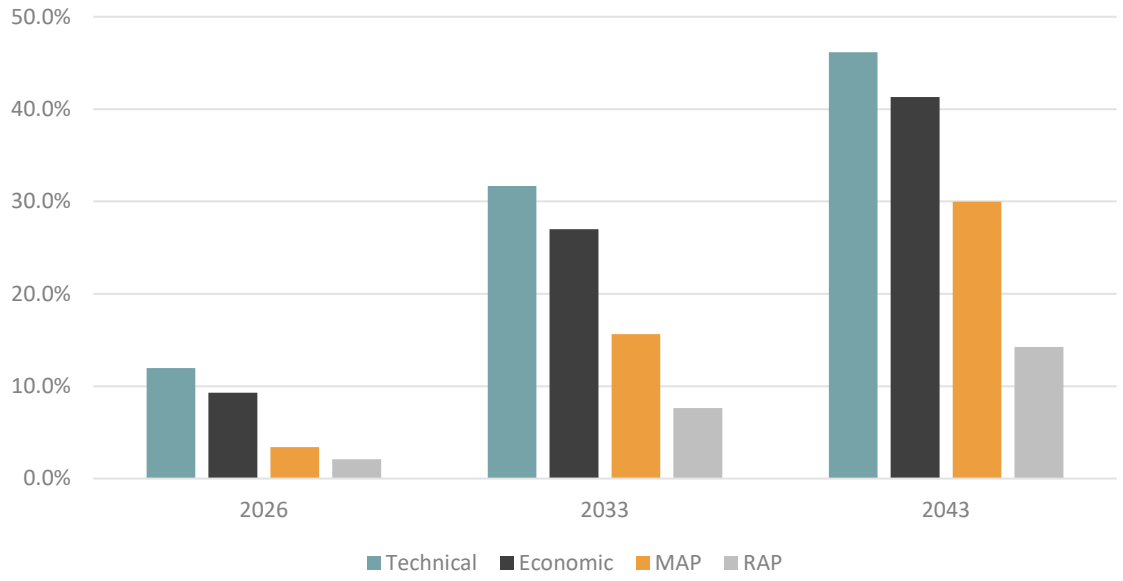


Table 5-2 provides cumulative annual technical, economic, MAP and RAP energy savings, in total MMBtu and as a percentage of the sector-level sales forecast. The RAP increases to 2.1% cumulative annual savings over the next three years and rises to 14.3% by 2043.

TABLE 5-2 RESIDENTIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MMBtu					
Technical	2,931,900	5,549,809	7,983,651	22,231,005	34,578,360
Economic	2,252,948	4,255,105	6,216,452	18,964,120	30,943,611
MAP	716,921	1,436,433	2,264,810	10,984,987	22,460,921
RAP	504,143	931,185	1,384,150	5,347,188	10,683,771
Forecasted Sales	65,784,000	66,297,000	66,826,000	70,212,110	74,938,289
Energy Savings (as % of Forecast)					
Technical	4.5%	8.4%	11.9%	31.7%	46.1%
Economic	3.4%	6.4%	9.3%	27.0%	41.3%
MAP	1.1%	2.2%	3.4%	15.6%	30.0%
RAP	0.8%	1.4%	2.1%	7.6%	14.3%

Table 5-3 provides the incremental annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The incremental RAP holds steady at 0.8% per year over the next three years.

TABLE 5-3 RESIDENTIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
MMBtu					
Technical	2,931,900	2,931,900	2,931,900	2,931,900	2,931,900
Economic	2,252,948	2,252,948	2,252,948	2,252,948	2,252,948
MAP	716,921	716,921	716,921	716,921	716,921
RAP	504,143	504,143	504,143	504,143	504,143
Forecasted Sales	65,784,000	66,297,000	66,826,000	70,212,110	74,938,289
Energy Savings (as % of Forecast)					
Technical	4.5%	4.4%	4.4%	4.2%	3.9%
Economic	3.4%	3.4%	3.4%	3.2%	3.0%
MAP	1.1%	1.1%	1.1%	1.0%	1.0%
RAP	0.8%	0.8%	0.8%	0.7%	0.7%

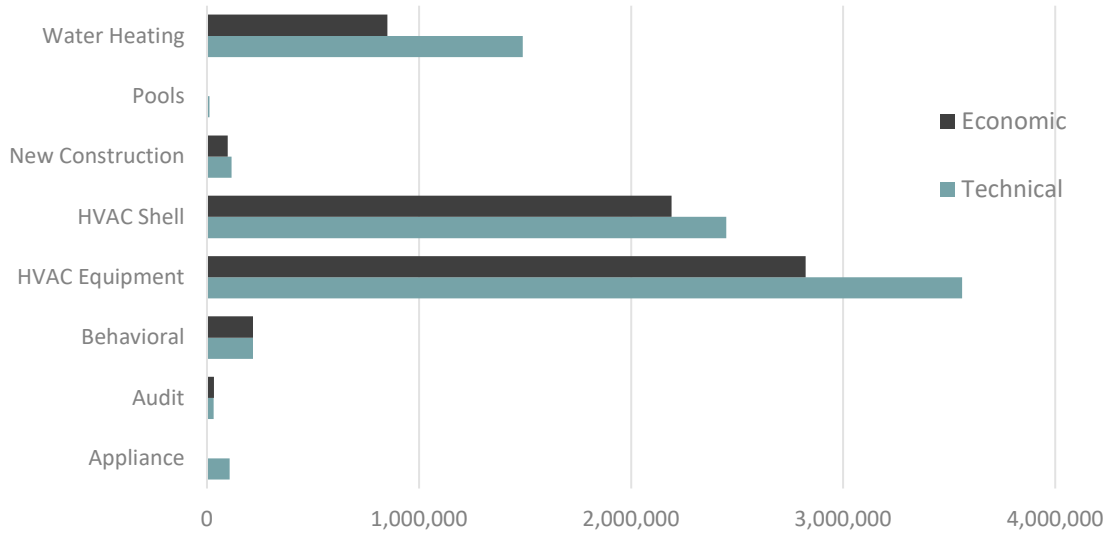
Technical & Economic Potential

Table 5-4 provides cumulative annual technical and economic potential results across the 2024-2026 timeframe, as well as for 2033 and 2043. Figure 5-2 shows a comparison of the technical and economic potential (3-year) by end use. HVAC Equipment and HVAC Shell are the leading end-uses among technical and economic potential.

TABLE 5-4 TECHNICAL AND ECONOMIC RESIDENTIAL NATURAL GAS POTENTIAL

	2024	2025	2026	2033	2043
Energy (MMBtu)					
Technical	2,931,900	5,549,809	7,983,651	22,231,005	34,578,360
Economic	2,252,948	4,255,105	6,216,452	18,964,120	30,943,611

FIGURE 5-2 3-YEAR TECHNICAL AND ECONOMIC RESIDENTIAL NATURAL GAS POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 5-3 illustrates the cumulative annual MAP results by end use across the 2024-2026 timeframe. Over the next 3 years, HVAC Equipment, HVAC Shell and Water Heating are the leading end-uses, accounting for 96% of the potential across the timeframe.

FIGURE 5-3 RESIDENTIAL NATURAL GAS ENERGY (CUMULATIVE ANNUAL MMBTU) MAP POTENTIAL BY END-USE

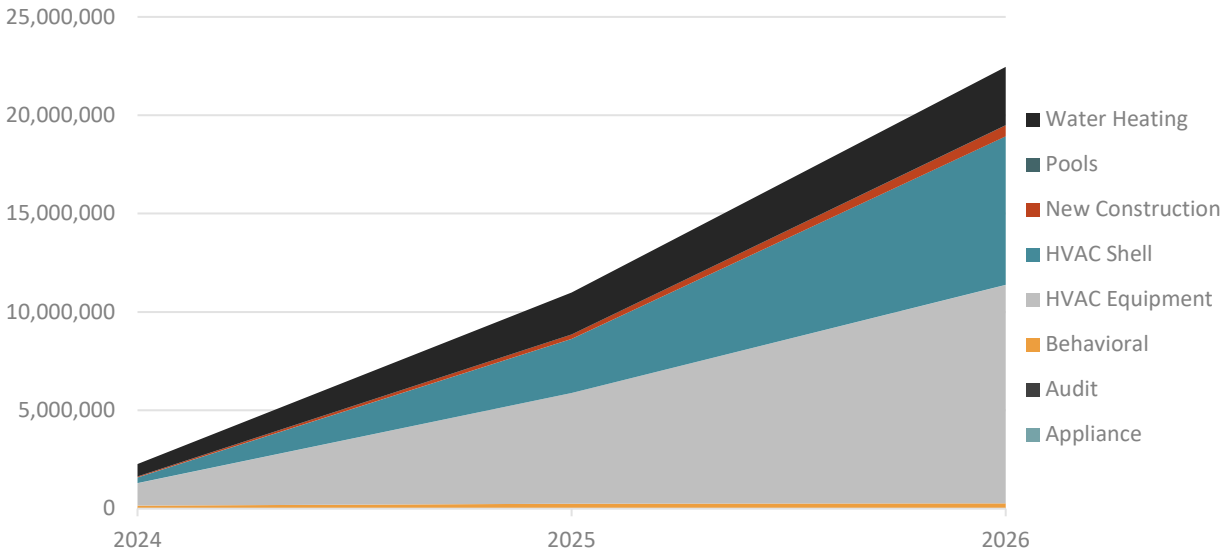


Table 5-5 provides the incremental and cumulative annual MAP across the 2024-2026 timeframe, as well as for 2033 and 2043. HVAC Equipment, HVAC Shell and Water Heating measures provide the greatest cumulative annual MAP over the next three years.

TABLE 5-5 RESIDENTIAL NATURAL GAS MAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MMBtu					
Appliances	941	1,023	1,088	1,282	1,554
Audit	810	1,213	1,766	7,683	8,913
Behavioral[12]	118,948	136,713	150,921	227,393	242,785
HVAC Equipment	312,930	382,604	450,713	741,340	812,056
HVAC Shell	62,346	93,054	134,858	509,053	522,843
New Construction	13,743	16,344	18,352	27,759	57,358
Pools	0	0	0	0	0
Water Heating	207,204	211,040	214,770	229,963	259,992
Total	716,921	841,991	972,468	1,744,472	1,905,499
% Of Forecasted Sales	1.1%	1.3%	1.5%	2.5%	2.5%
Cumulative Annual MMBtu [13]					
Appliances	941	1,964	3,052	11,659	19,523
Audit	810	1,213	1,766	7,683	8,913
Behavioral	118,948	136,713	150,921	227,393	242,785
HVAC Equipment	312,930	695,051	1,144,527	5,626,879	11,101,685
HVAC Shell	62,346	154,976	288,620	2,761,203	7,561,399
New Construction	13,743	30,087	48,438	220,593	559,755
Pools	0	0	0	0	0
Water Heating	207,204	416,430	627,487	2,129,579	2,966,862
Total	716,921	1,436,433	2,264,810	10,984,987	22,460,921
% Of Forecasted Sales	1.1%	2.2%	3.4%	15.6%	30.0%

Realistic Achievable Potential

Figure 5-4 illustrates the cumulative annual RAP results by end use across the 2024-2026 timeframe. Over the next 3 years, HVAC Equipment, HVAC Shell and Water Heating are the leading end-uses, accounting for 94% of the potential across the timeframe.

Table 5-6 provides the incremental and cumulative annual RAP across the 2024-2026 timeframe, as well as for 2033 and 2043. HVAC Equipment, HVAC Shell and Behavioral measures provide the greatest cumulative annual RAP over the next three years.

[12] The behavioral end-use includes home energy reports and home energy management systems (HEMs).

[13] Audit measures and most Behavioral measures have a one-year assumed measure life. For this reason, Audit savings are the same for both incremental and cumulative annual, and there is only a minor difference between incremental and cumulative annual savings for Behavioral measures.

FIGURE 5-4 RESIDENTIAL NATURAL GAS ENERGY (CUMULATIVE ANNUAL MMBTU) RAP POTENTIAL BY END-USE

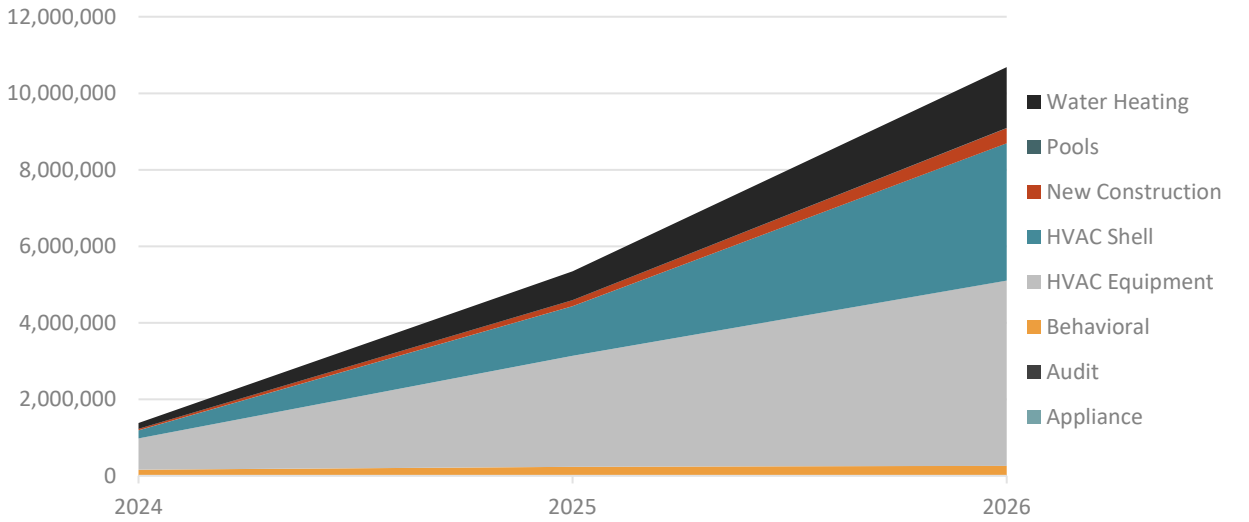


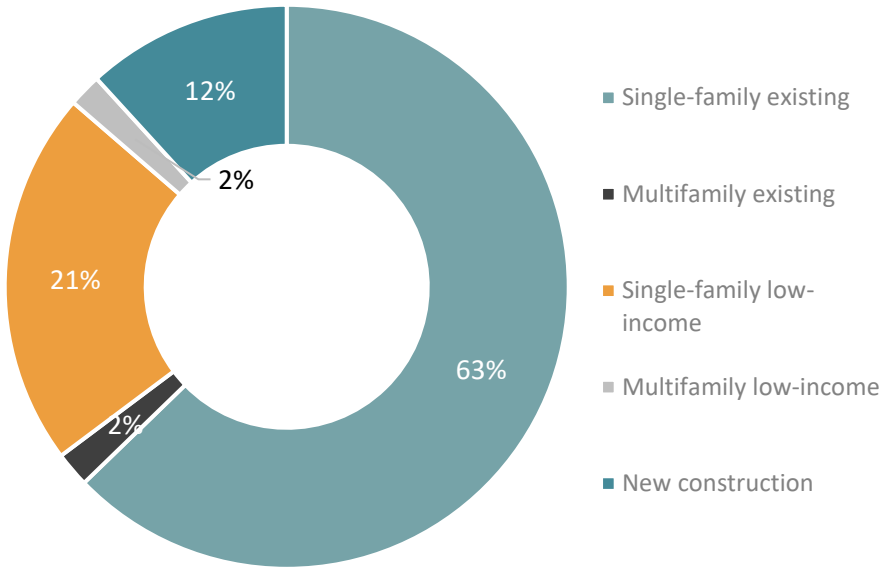
TABLE 5-6 RESIDENTIAL NATURAL GAS RAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MMBtu					
Appliances	883	893	902	947	1,069
Audit	722	938	1,201	4,129	6,291
Behavioral[14]	121,085	139,759	157,260	225,953	242,785
HVAC Equipment	267,120	272,953	278,203	314,316	349,555
HVAC Shell	55,853	69,982	86,054	208,075	254,925
New Construction	12,430	13,354	13,916	19,245	40,954
Pools	0	0	0	0	0
Water Heating	46,050	51,581	57,448	107,254	153,051
Total	504,143	549,460	594,984	879,919	1,048,630
% Of Forecasted Sales	0.8%	0.8%	0.9%	1.3%	1.4%
Cumulative Annual MMBtu [15]					
Appliances	883	1,776	2,678	9,191	13,972
Audit	722	938	1,201	4,129	6,291
Behavioral	121,085	139,759	157,260	225,953	242,785
HVAC Equipment	267,120	539,763	817,325	2,899,498	4,843,072
HVAC Shell	55,853	125,560	210,995	1,297,089	3,588,418
New Construction	12,430	25,784	39,700	158,619	395,082
Pools	0	0	0	0	0
Water Heating	46,050	97,605	154,991	752,709	1,594,150
Total	504,143	931,185	1,384,150	5,347,188	10,683,771
% Of Forecasted Sales	0.8%	1.4%	2.1%	7.6%	14.3%

[14] The behavioral end-use includes home energy reports and home energy management systems (HEMs).
[15] Audit measures and most Behavioral measures have a one-year assumed measure life. For this reason, Audit savings are the same for both incremental and cumulative annual, and there is only a minor difference between incremental and cumulative annual savings for Behavioral measures.

Figure 5-5 illustrates a market segmentation of the RAP in the residential sector by 2026. Nearly two-thirds of the RAP is associated with single-family existing homes that are not low-income, whereas the total low-income potential is about 23% of the RAP.[16]

FIGURE 5-5 2026 RESIDENTIAL NATURAL GAS ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT



5.3 RESIDENTIAL BENEFITS & COSTS (RAP SCENARIO)

Table 5-7 provides the net present value (NPV) benefits and costs, as calculated using the UCT, across the 2024-2043 timeframe for the RAP scenario. The overall UCT ratio is 1.1.

TABLE 5-7 RESIDENTIAL NPV BENEFITS & COSTS RAP BY END-USE ($ IN MILLIONS)

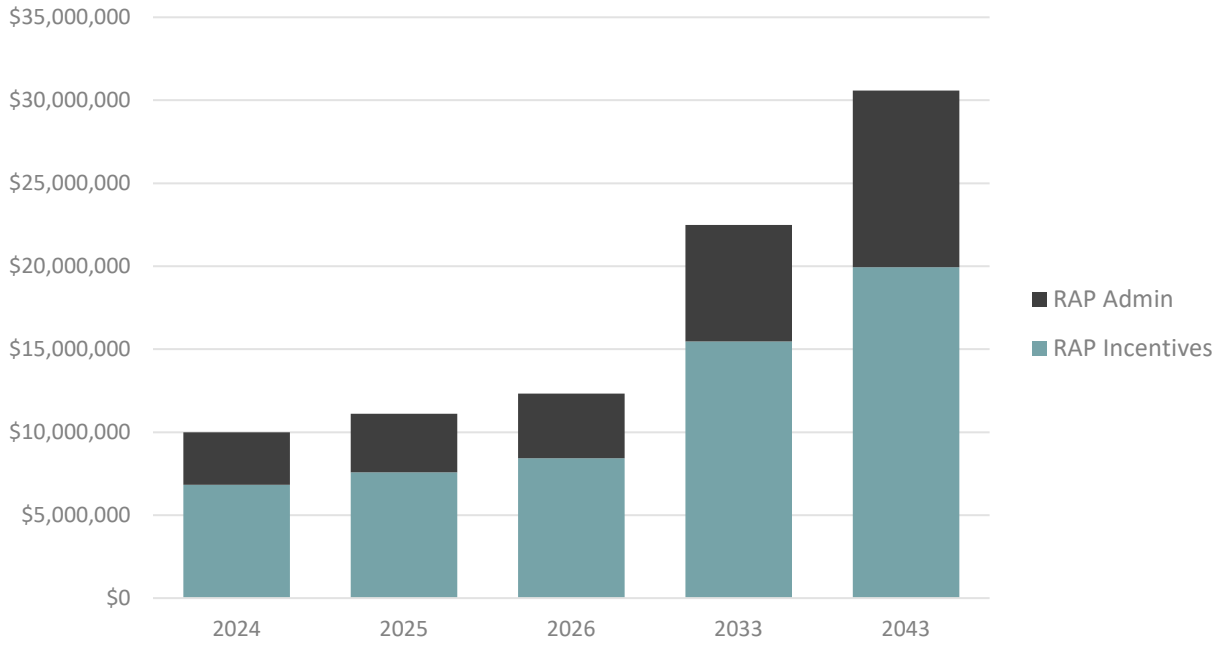
End Use	NPV Benefits	NPV Costs	UCT Ratio
Overall Results			
Appliance	$451,856	$1,529,460	0.3
Audit	$133,780	$4,578,703	0.0
Behavioral	$8,439,777	$11,713,289	0.7
HVAC Equipment	$89,942,101	$62,456,783	1.4
HVAC Shell	$103,812,512	$95,815,387	1.1
New Construction	$5,614,877	$3,945,786	1.4
Pools	$0	$0	0.0
Water Heating	$35,432,159	$34,114,141	1.0
Total	$243,827,063	$214,153,549	1.1

Figure 5-6 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the initial 3-years of the study timeframe as well as the 10-year and 20-year

[16] The low-income measures in the RAP analysis did not have to pass the UCT.

timeframe. The incentives rise from $6.8 million to $19.9 million, and overall budgets rise from $10.0 million to $30.6 million by 2043.

FIGURE 5-6 ANNUAL BUDGETS FOR RESIDENTIAL RAP ($ IN MILLIONS)



6 Commercial & Industrial Energy Efficiency Potential

This section provides the potential results for technical, economic, MAP and RAP for the commercial and industrial sectors. Results are broken down by sector and end use. The cost-effectiveness results and budgets for the RAP scenario are also provided.

6.1 SCOPE OF MEASURES & END USES ANALYZED

There were 120 total natural gas measures included in the C&I analysis. Table 6-1 provides the number of measures by end-use (the full list of measures is provided in the appendices volume of this report). The measure list was developed based on a review of current NIPSCO programs, the Indiana TRM, other regional TRMs, and industry documents related to emerging technologies. Data collection activities to characterize measures formed the basis of the assessment of incremental costs, natural gas savings, and measure life.

TABLE 6-1 C&I ENERGY EFFICIENCY MEASURES – BY END USE

End-Use	# Of Unique Commercial Measures	# Of Unique Industrial Measures
Agriculture	0	4
Cooking	8	0
Industrial Process	0	29
Pools	3	0
Space Heating	41	25
Water Heating	10	0

6.2 TOTAL C&I GAS POTENTIAL SUMMARY

Figure 6-1 provides the technical, economic, MAP and RAP results for the 3-year, 10-year, and 20-year timeframes. The 3-year technical and economic potential are roughly 7.7% and 7.0% of forecasted sales.[17] The 3-year MAP is 1.4% and the RAP is 1.0%.

Table 6-2 provides *cumulative annual* technical, economic, MAP and RAP energy savings, in total MMBtu and as a percentage of the C&I sales forecast. The RAP reaches 1.1% after three years and rises to 11.0% by 2043.

Table 6-3 provides the *incremental annual* technical, economic, MAP and RAP energy savings, in total MMBtu and as a percentage of the C&I sales forecast. The incremental RAP ranges from 0.3% to 1.2% per year over the study horizon.

[17] Technical and economic potential are similar as NIPSCO's historical incentive levels are traditionally structured to ensure a cost-effective delivery option. Additional discussions on the development of assumed incentive levels are included in Section 4.4.3.1

FIGURE 6-1 C&I GAS ENERGY CUMULATIVE ANNUAL POTENTIAL (AS A % OF C&I SALES)

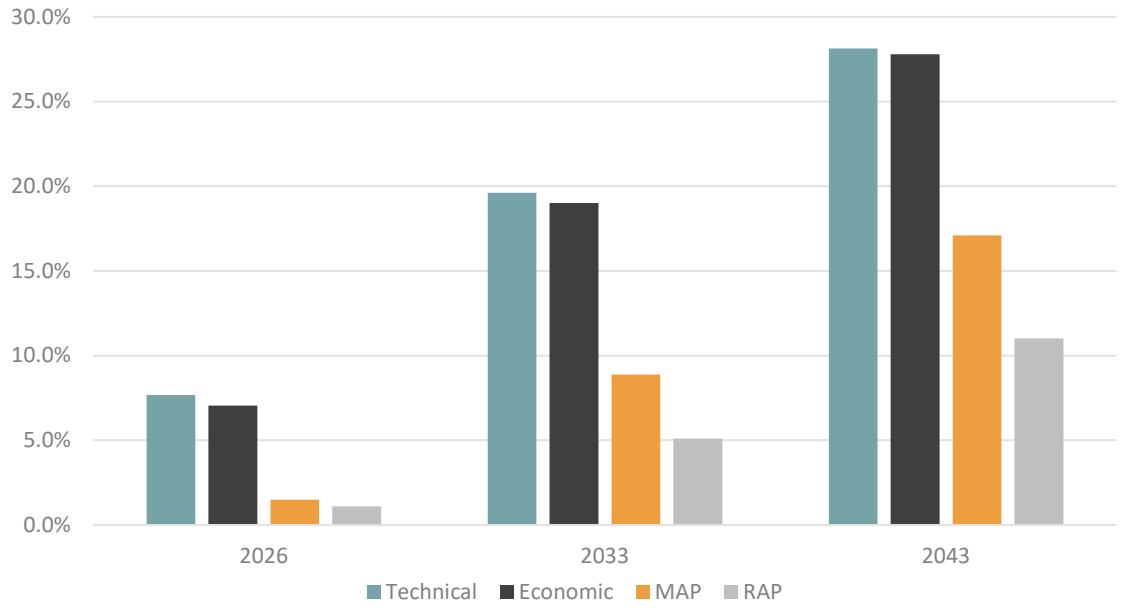


TABLE 6-2 C&I CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
Energy (MMBtu)					
Technical	1,325,323	2,517,718	3,629,374	9,494,848	14,046,462
Economic	1,111,061	2,222,122	3,333,182	9,197,476	13,878,517
MAP	174,746	409,025	710,155	4,295,252	8,534,348
RAP	148,017	321,048	521,036	2,469,128	5,498,635
Forecasted Sales	47,033,808	47,170,591	47,323,747	48,395,837	49,927,393
Energy Savings (as % of Forecast)					
Technical	2.8%	5.3%	7.7%	19.6%	28.1%
Economic	2.4%	4.7%	7.0%	19.0%	27.8%
MAP	0.4%	0.9%	1.5%	8.9%	17.1%
RAP	0.3%	0.7%	1.1%	5.1%	11.0%

TABLE 6-3 C&I INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	1,325,323	1,325,323	1,325,323	1,325,323	1,384,992
Economic	1,111,061	1,111,061	1,111,061	1,111,636	1,231,268
MAP	174,746	234,280	301,130	734,502	856,239
RAP	148,017	173,030	199,989	415,654	611,537
Forecasted Sales	47,033,808	47,170,591	47,323,747	48,395,837	49,927,393
Energy Savings (as % of Forecast)					
Technical	2.8%	2.8%	2.8%	2.7%	2.8%
Economic	2.4%	2.4%	2.3%	2.3%	2.5%
MAP	0.4%	0.5%	0.6%	1.5%	1.7%
RAP	0.3%	0.4%	0.4%	0.9%	1.2%

6.3 COMMERCIAL GAS POTENTIAL

This section provides detail regarding the commercial gas energy efficiency potential in the NIPSCO service area. Industrial sector detail is provided in Section 6.4.

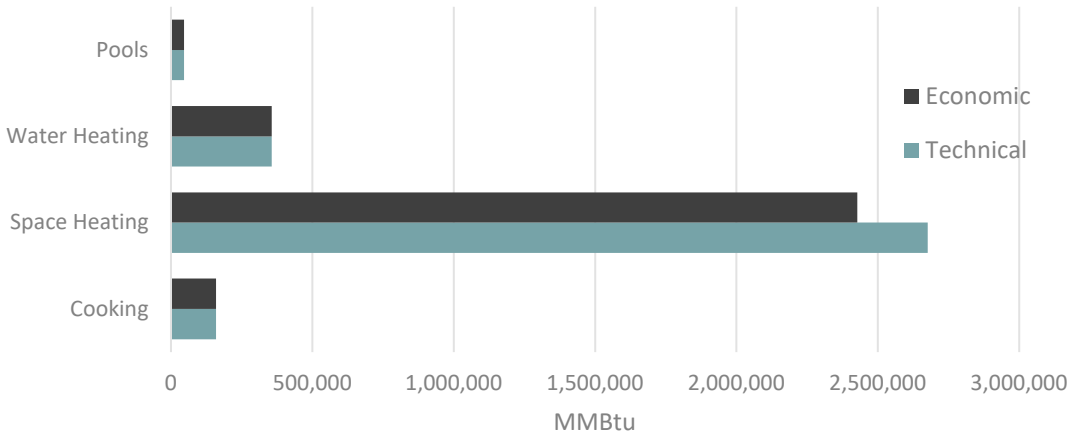
Technical & Economic Potential

Table 6-4 provides cumulative annual technical and economic potential results across the 2024-2026 timeframe, as well as for 2033 and 2043. Figure 6-2 shows a comparison of the 2024-2026 cumulative annual technical and economic potential by end use. Space heating accounts for more than 80% of the technical and economic commercial potential savings, with water heating, cooking, and pools accounting for less than 20% combined. All commercial gas measures screened as cost effective according to the UCT Test, apart from gas furnace tune-ups and window insulation kits.

TABLE 6-4 TECHNICAL & ECONOMIC COMMERCIAL GAS POTENTIAL

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	1,188,267	2,243,606	3,239,574	8,455,148	12,474,297
Economic	996,943	1,993,886	2,990,829	8,211,325	12,351,101

FIGURE 6-2 3-YEAR TECHNICAL AND ECONOMIC COMMERCIAL GAS POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 6-3 illustrates the cumulative annual MAP results by end use across the 2024-2026 timeframe. The space heating end-use is the predominant source of gas savings potential, and cumulative annual savings increase from 0.4% of sales to 1.7% of sales over the 3-yr period under the MAP scenario.

FIGURE 6-3 COMMERCIAL GAS ENERGY (CUMULATIVE ANNUAL MMBTU) MAP POTENTIAL BY END-USE

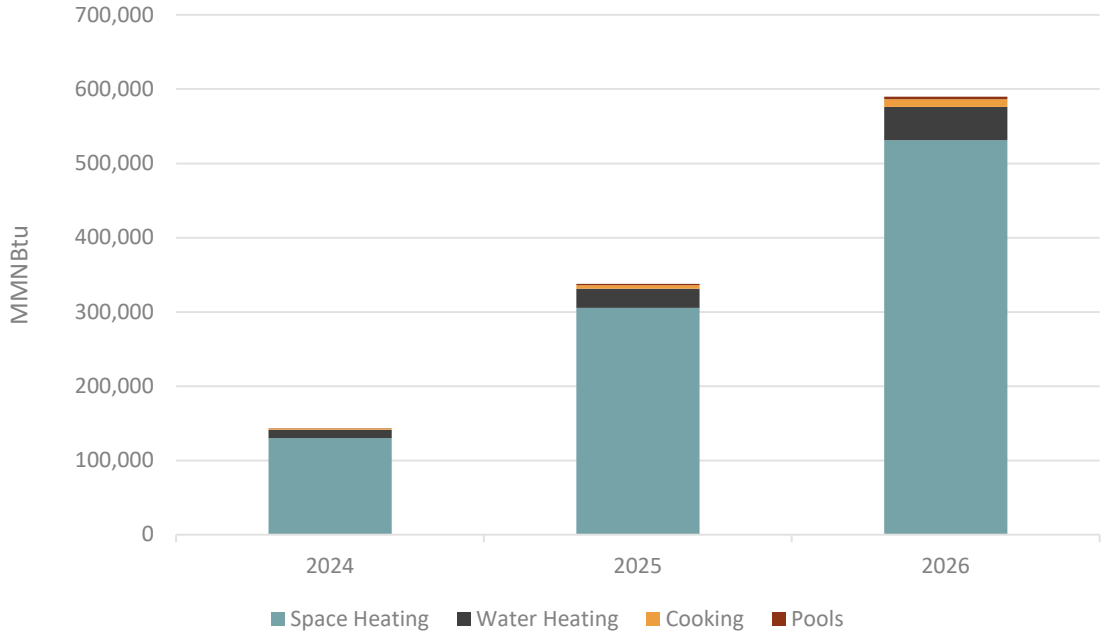


Table 6-5 provides the incremental and cumulative annual MAP across the 2024-2026 timeframe, as well as for 2033 and 2043. In the MAP scenario, commercial cumulative annual savings increases to 19.1% by 2043.

TABLE 6-5 COMMERCIAL GAS MAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MMBtu					
Cooking	2,117	3,826	6,054	31,418	36,595
Space Heating	130,038	175,364	225,819	549,810	645,241
Water Heating	28,909	36,383	44,425	80,750	83,824
Pools	491	982	1,637	9,331	10,913
Total	**161,556**	**216,554**	**277,935**	**671,308**	**776,574**
% Of Forecasted Sales	***0.4%***	***0.6%***	***0.7%***	***1.7%***	***1.9%***
Cumulative Annual MMBtu					
Cooking	2,117	5,943	11,997	155,697	378,712
Space Heating	130,038	305,402	531,221	3,120,831	6,181,736
Water Heating	28,909	65,292	109,717	585,685	1,000,513
Pools	491	1,473	3,110	45,694	118,101
Total	**161,556**	**378,110**	**656,045**	**3,907,907**	**7,679,063**
% Of Forecasted Sales	***0.4%***	***1.0%***	***1.7%***	***10.1%***	***19.1%***

Realistic Achievable Potential

Figure 6-4 illustrates the cumulative annual RAP results by end use across the 2024-2026 timeframe. Like MAP, space heating makes up the majority of the gas efficiency savings in the RAP scenario. After 3 years, RAP potential is roughly 74% of the MAP potential, or 1.3% of forecasted commercial sales.

FIGURE 6-4 COMMERCIAL GAS ENERGY (CUMULATIVE ANNUAL MMBTU) RAP POTENTIAL BY END-USE

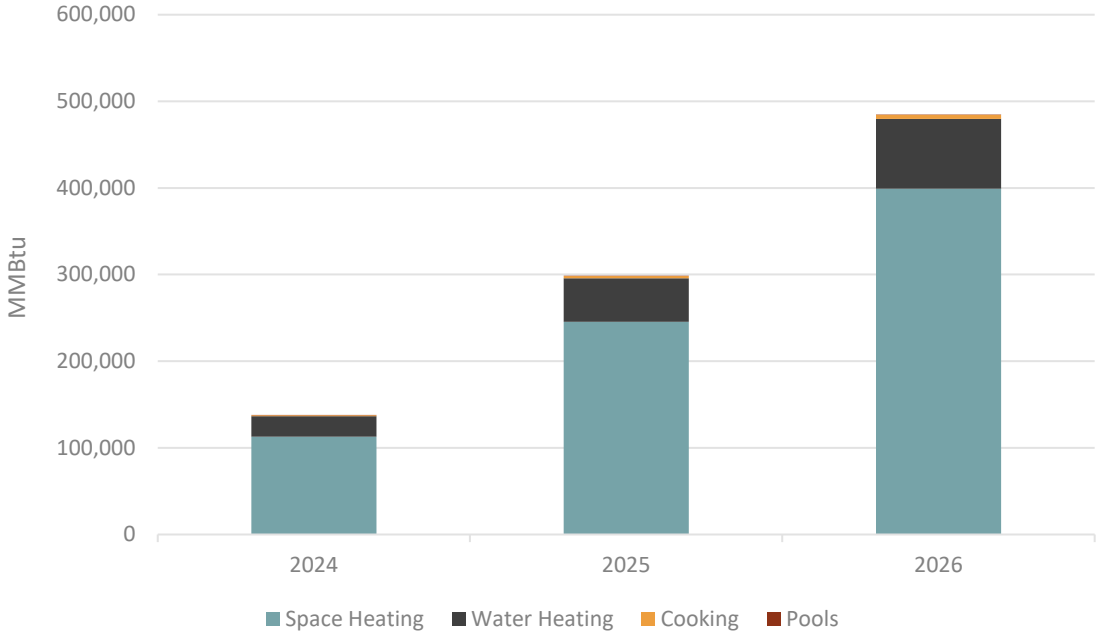


Table 6-6 provides the incremental and cumulative annual RAP across the 2024-2026 timeframe, as well as for 2033 and 2043. In the RAP scenario, C&I cumulative annual savings increases to 12.3% by 2043.

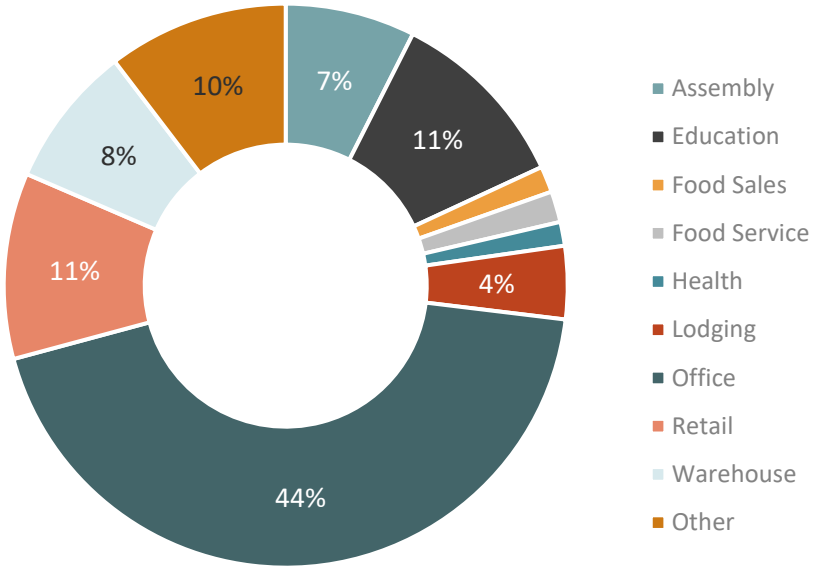
TABLE 6-6 COMMERCIAL GAS RAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MWh					
Cooking	1,001	1,576	2,327	12,992	23,146
Space Heating	113,061	132,572	153,676	320,344	480,896
Water Heating	23,454	26,826	29,979	44,379	48,998
Pools	73	170	306	2,519	4,863
Total	**137,588**	**161,145**	**186,289**	**380,235**	**557,903**
% Of Forecasted Sales	***0.4%***	***0.4%***	***0.5%***	***1.0%***	***1.4%***
Cumulative Annual MWh					
Cooking	1,001	2,576	4,903	58,680	208,658
Space Heating	113,061	245,633	399,309	1,846,050	4,135,235
Water Heating	23,454	50,280	80,260	347,625	557,905
Pools	73	243	550	10,359	44,537
Total	**137,588**	**298,733**	**485,021**	**2,262,714**	**4,946,335**
% Of Forecasted Sales	***0.4%***	***0.8%***	***1.3%***	***5.8%***	***12.3%***

Figure 6-5 illustrates the market segmentation of the RAP in the commercial sector in 2026. The distribution of gas energy efficiency savings by building type is consistent with the overall gas sales by

building, with offices, retail, education, and other as the leading building types, both by sales (see Figure 3-4) as well as gas savings.

FIGURE 6-5 2026 COMMERCIAL GAS (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT[18]



6.4 INDUSTRIAL GAS POTENTIAL

This section provides detail regarding the industrial gas energy efficiency potential in the NIPSCO service area.

Technical & Economic Potential

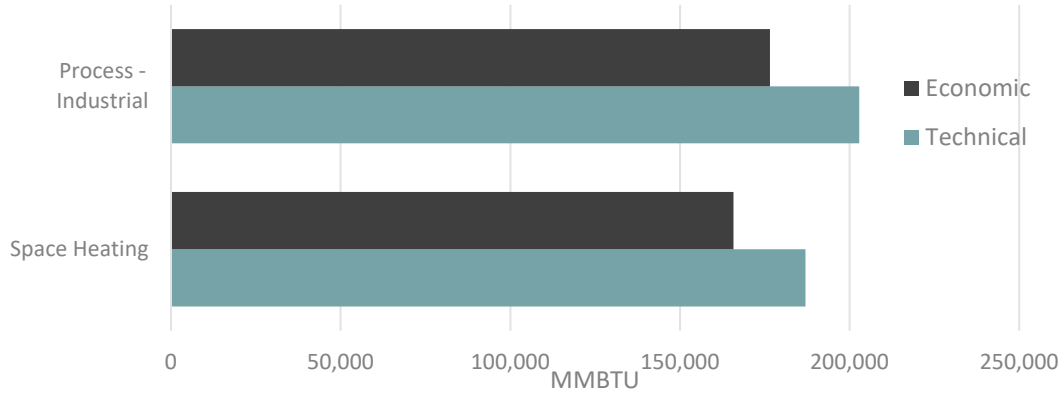
Table 6-7 provides cumulative annual industrial technical and economic potential results from 2024-2026, 2033, and 2043. Figure 6-6 shows a comparison of the technical and economic potential (3-year) by end use. Process industrial measures account for roughly 52% of the technical and economic potential, while space heating measures account for approximately 48% of the technical and economic potential. Process and space heating system tune-ups were the major industrial measures that did not screen as cost-effective according to the UCT Test.

TABLE 6-7 TECHNICAL AND ECONOMIC INDUSTRIAL GAS POTENTIAL

	2024	2025	2026	2033	2043
Energy (MWh)					
Technical	137,056	274,113	389,800	1,039,701	1,572,165
Economic	114,118	228,235	342,353	986,151	1,527,416

[18] Missing labels reflect commercial building segments with gas savings < 2% of 2026 cumulative annual realistic achievable potential.

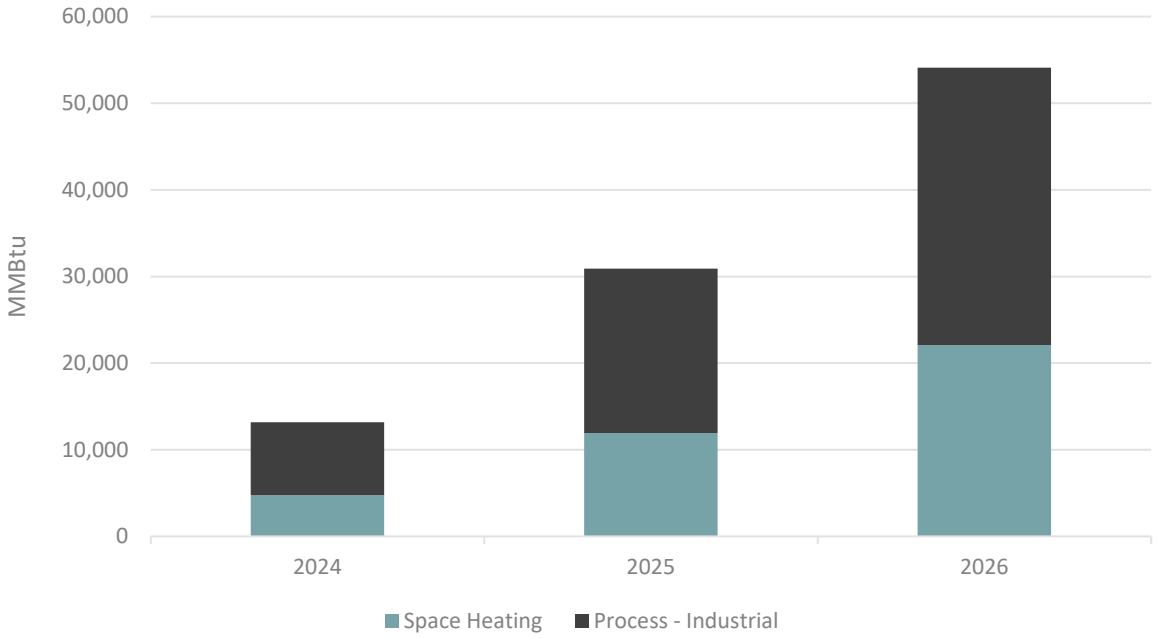
FIGURE 6-6 THREE-YEAR TECHNICAL AND ECONOMIC INDUSTRIAL GAS POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 6-7 illustrates the cumulative annual MAP results by end use across the 2024-2026 timeframe. Process-industrial is the end-use with the largest share of potential near-term. Table 6-8 shows the incremental and cumulative annual industrial MAP potential for the 2024-2026 timeframe, as well as the 10-year and 20-year outlook. Industrial MAP potential is roughly 9% of forecasted industrial gas sales by 2043, or just over 56% of the economic potential.[19]

FIGURE 6-7 INDUSTRIAL GAS ENERGY (CUMULATIVE ANNUAL MMBTU) MAP POTENTIAL BY END-USE



[19] Approximately 20% of industrial gas sales are estimated to be used for CHP/Cogeneration and are not impacted by the space heating and industrial process measures included in this analysis; however, they are included in the sales forecast denominator.

TABLE 6-8 INDUSTRIAL GAS MAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MMBtu					
Space Heating	4,763	7,174	10,151	32,790	38,771
Process - Industrial	8,427	10,551	13,044	30,404	40,895
Total	**13,190**	**17,725**	**23,195**	**63,193**	**79,665**
% Of Forecasted Sales	***0.1%***	***0.2%***	***0.2%***	***0.7%***	***0.8%***
Cumulative Annual MMBtu					
Space Heating	4,763	11,937	22,088	174,538	308,856
Process - Industrial	8,427	18,978	32,022	212,807	546,430
Total	**13,190**	**30,915**	**54,110**	**387,345**	**855,286**
% Of Forecasted Sales	***0.1%***	***0.3%***	***0.6%***	***4.0%***	***8.9%***

Realistic Achievable Potential

Figure 6-8 illustrates the cumulative annual RAP results by end use across the 2024-2026 timeframe. Like MAP, industrial process measures make up a greater share of the overall incremental and cumulative annual potential over the 2024-2026 timeframe. Table 6-9, includes the 10-year and 20-year incremental and cumulative potentials. Over the long-term, space heating and process industrial savings become more evenly distributed on an incremental basis, though process industrial remains the largest contributor on a cumulative annual basis.

FIGURE 6-8 INDUSTRIAL GAS ENERGY (CUMULATIVE ANNUAL MWH) RAP POTENTIAL BY END-USE

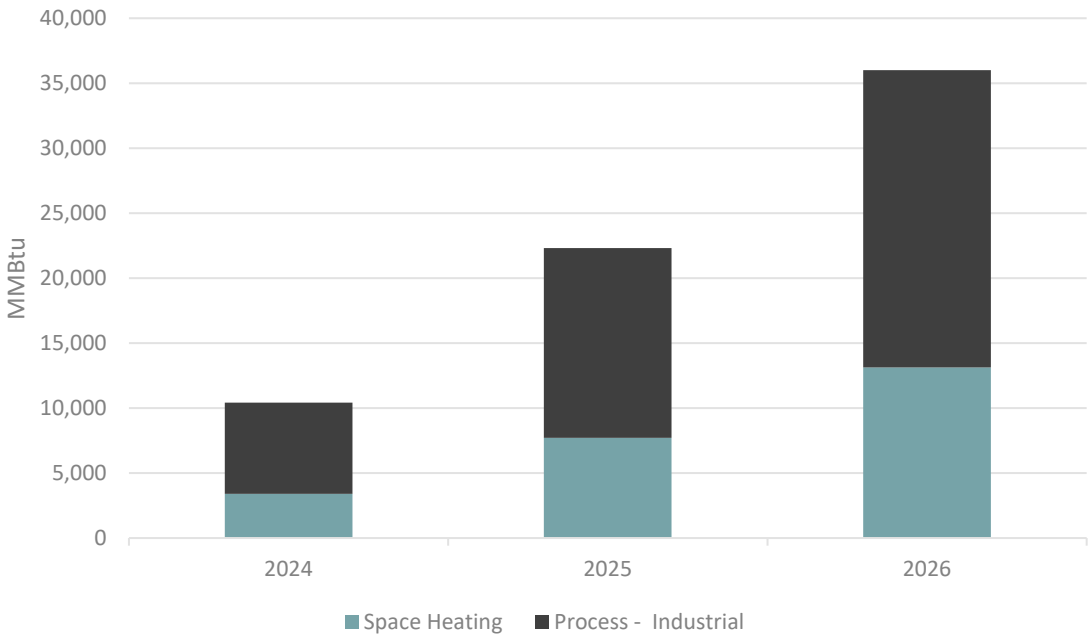
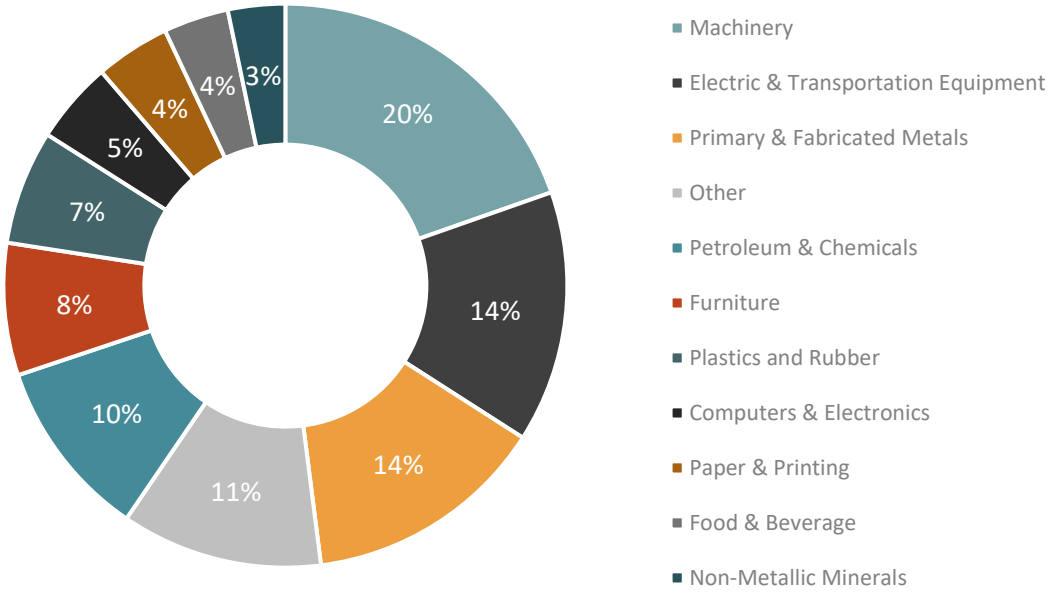


TABLE 6-9 INDUSTRIAL GAS RAP BY END-USE

End Use	2024	2025	2026	2033	2043
Incremental Annual MMBtu					
Space Heating	3,394	4,316	5,417	16,618	24,665
Process - Industrial	7,035	7,570	8,284	18,802	28,969
Total	**10,429**	**11,886**	**13,700**	**35,420**	**53,634**
% Of Forecasted Sales	***0.1%***	***0.1%***	***0.1%***	***0.4%***	***0.6%***
Cumulative Annual MMBtu					
Space Heating	3,394	7,710	13,127	88,403	209,364
Process - Industrial	7,035	14,604	22,888	118,011	342,937
Total	**10,429**	**22,315**	**36,015**	**206,414**	**552,301**
% Of Forecasted Sales	***0.1%***	***0.2%***	***0.4%***	***2.1%***	***5.7%***

Figure 6-9 illustrates a market segmentation of the RAP in the industrial sector by 2026. Machinery, Electric and Transportation Equipment, Primary & Fabricated metals and Other are the leading industrial market segments.

FIGURE 6-9 2026 INDUSTRIAL GAS ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT[20]



[20] "Other" industrial includes: Textile Mill Products, Apparel, Wood, and Miscellaneous industrial.

6.5 C&I SECTOR BENEFITS & COSTS (RAP SCENARIO)

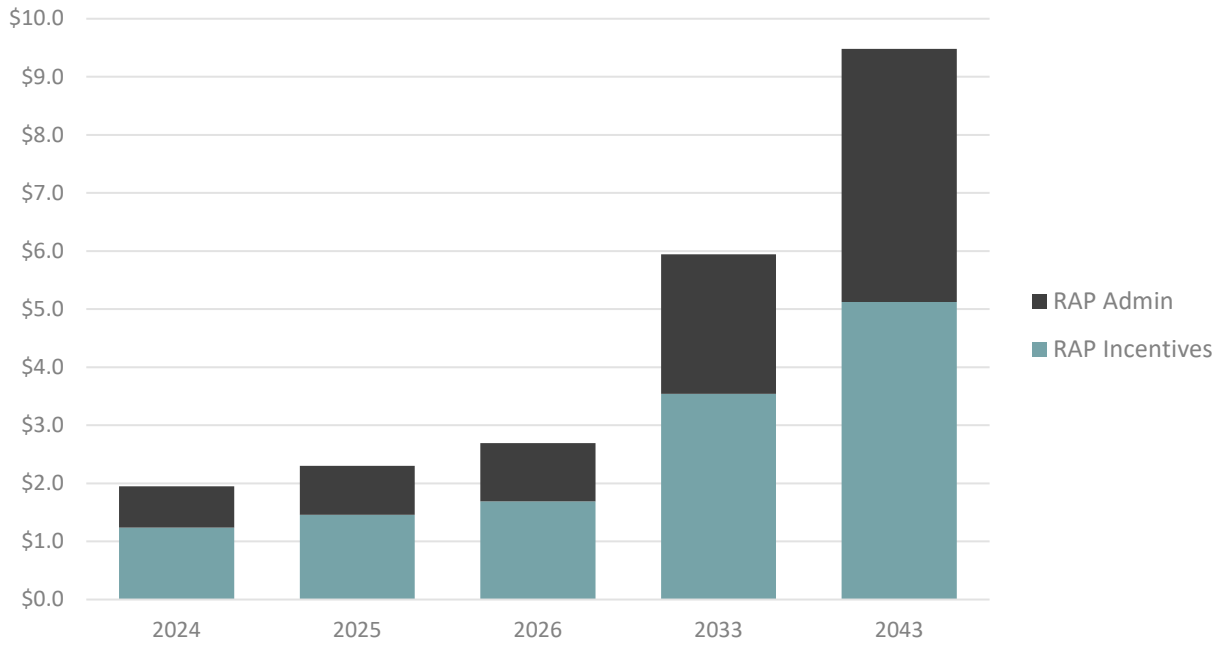
Table 6-10 provides the NPV benefits and costs, as calculated using the UCT, across the 2024-2043 timeframe for the RAP scenario. Overall, the C&I sector has an estimated 2.3 UCT ratio, based on the entire 20-year RAP potential for gas savings.

TABLE 6-10 C&I NPV BENEFITS & COSTS RAP BY END-USE ($ IN MILLIONS)

End Use	NPV Benefits	NPV Costs	UCT Ratio
Commercial			
Cooking	$4.2	$2.0	2.1
Space Heating	$105.9	$47.8	2.2
Water Heating	$15.9	$5.8	2.7
Pools	$0.9	$0.4	2.4
Industrial			
Space Heating	$5.0	$2.3	2.2
Process - Industrial	$8.8	$2.7	3.3
C&I Totals			
Commercial Total	$126.9	$55.9	2.3
Industrial Total	$13.7	$4.9	2.8
C&I Combined	$140.6	$60.9	2.3

Figure 6-10 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the initial 3-years of the study timeframe, as well as the 10-year and 20-year timeframe. The incentives rise from $1.2 million to over $5 million, and overall budgets rise from $1.9 million to $9.5 million by 2043.

FIGURE 6-10 ANNUAL BUDGETS FOR C&I RAP ($ IN MILLIONS)



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NIPSCO

NORTHERN INDIANA PUBLIC SERVICE

Demand Side Management Market Potential Study

VOLUME II GAS ENERGY EFFICIENCY POTENTIAL

2021

GDS Associates, Inc.
ENGINEERS & CONSULTANTS

Demand Side Analytics
DATA DRIVEN RESEARCH AND INSIGHTS

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Demand Side Management Market

VOLUME III DEMAND RESPONSE POTENTIAL

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1 Introduction

This Demand Response Market Potential Study was conducted to support the Integrated Resource Plan (IRP) and DSM planning for NIPSCO. The study included a comprehensive review of current programs, historical savings, and projected energy and demand savings opportunities to develop estimates of achievable potential. The effort was highly collaborative, as the GDS Team worked closely alongside NIPSCO, as well as the NIPSCO Oversight Board, to produce reliable estimates of future savings potential, using the best available information and best practices for developing market potential savings estimates.

This volume includes estimates of the demand response market potential. Estimates of electric and natural gas energy efficiency potential are included in Volume I and Volume II, respectively.

1.1 TYPES OF POTENTIAL ESTIMATED

This volume provides estimates of the maximum achievable potential (MAP) and realistic achievable potential (RAP) for demand response offerings, along with the cost of acquiring the two levels of achievable potential. The body of this report provides inputs and results by sector and program for a base case set of assumptions for both MAP and RAP scenarios, while additional results for a lower avoided cost case are presented in Section 6. The outputs of this analysis will be used as inputs for NIPSCO's 2021 Integrated Resource Plan (IRP).

In the residential sector, this study assessed the following demand response offerings: a residential smart thermostat program, a water heater direct load control program, and a residential dynamic rates (critical peak pricing) program. For the commercial and industrial (C&I) sector, the considered programs included a small C&I dynamic rates (critical peak pricing) program and a medium and large C&I load curtailment program.

In IRP modeling, NIPSCO will consider demand response alongside other supply resources to supply capacity and energy needs. To facilitate this effort, the GDS team provided NIPSCO with annual program potential and costs for the RAP and MAP scenarios for three program sub-segments. The first sub-segment was the Residential segment, which includes the residential smart thermostat results, only because the water heater direct load control program was not found to be cost effective in any scenario. The second sub-segment was the C&I segment, which consists of the Medium and Large C&I load curtailment programs. The third and final sub-segment was the Dynamic Rates sub-segment, which includes both the Residential and Small C&I critical peak pricing dynamic rates programs.

1.2 IMPORTANT STUDY CONSIDERATIONS

A critical distinction between this study and past ones is the treatment of eligible load from a select set of NIPSCO large industrial customers that offer a substantial portion of their load to the Midcontinent Independent System Operator ("MISO") as a "load-modifying resource", or LMR. As discussed more in Section 2.2, NIPSCO no longer serves this portion of customer loads, and they have been removed from the baseline peak load forecast. While these customers still provide demand response, it is no longer part of NIPSCO's demand response portfolio, and this study does not include other load associated with these customers for additional demand response programs delivered by NIPSCO.

In addition, as discussed in the report in more detail, NIPSCO currently does not have the necessary advanced metering infrastructure (AMI) in place to implement the residential and small C&I dynamic rates

programs and the costs of these programs presented in this study do not reflect the full costs of AMI. This is because AMI can provide a number of benefits beyond the ability to implement DR programs, including reduced billing costs, faster outage restoration, and better visibility into customers' energy usage.

1.3 REPORT ORGANIZATION

The rest of the report is organized as follows:

Section 2 Study Context provides context for quantifying demand response market potential in the NIPSCO service area, including a review of prior demand response and the peak load forecast.

Section 3 Economic Modeling Framework details the methodology used to assess the potential for future demand response programs.

Section 4 Detailed Findings: Residential provides the results for achievable demand response programs in the residential sector.

Section 5 Detailed Findings: Non-residential provides the results for achievable demand response programs in the C&I Sectors.

Section 6 Alternate Avoided Cost Case Sensitivity provides the results for the alternate avoided cost sensitivity case, in which a lower avoided cost is used for cost-benefit modeling.

2 Study Context: Regulatory Framework, Prior Demand Response Programs, and Peak Load Forecast

One of the central goals of the IRP is to identify adequate resources to meet long-run projections of peak loads for the NIPSCO service territory, plus a reserve margin. Demand response is one of the resource types NIPSCO considers that satisfies the capacity requirements of the system. Other resource types include thermal generation, renewable generation, battery storage, and energy efficiency. To provide context for demand response market potential, this chapter describes and characterizes the current regulatory framework for demand response, NIPSCO's historical and existing demand response offerings, and NIPSCO's historical and forecast peak loads.

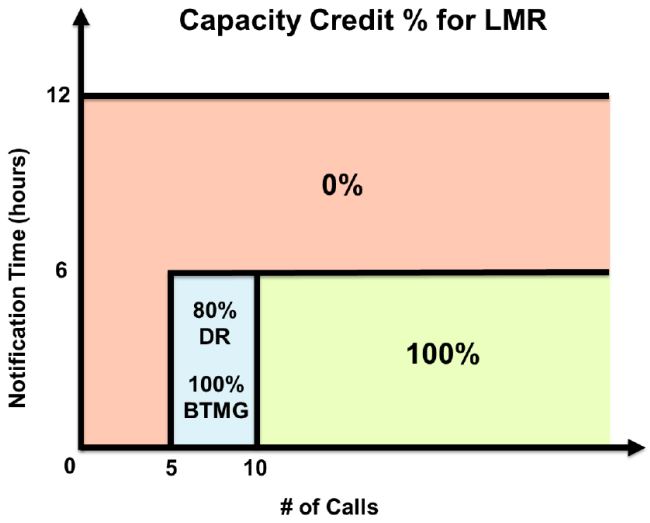
2.1 REGULATORY FRAMEWORK

As a vertically integrated utility participating in energy markets run by MISO, NIPSCO must procure sufficient capacity resources to satisfy peak load and reserve margin requirements. As discussed in more detail at the end of Section 2.4, this potential study focuses on summer afternoon and early evening (2-6 p.m.) demand response capacity, with all values representing system-level MW capacity, which grosses up meter-level impacts for line losses but also includes de-rates for expected event drop-outs (some demand response programs allow customers to opt out of certain events without penalty).

In MISO, demand response can only help to meet capacity requirements if it is nominated as an LMR to MISO. In August 2020, the Federal Energy Regulatory Commission ("FERC"), in docket ER20-1846, approved changes requested by MISO regarding LMR capacity accreditation that are relevant to this study and any demand response programs eventually offered by NIPSCO. Specifically, FERC approved MISO's proposal to require that LMR resources (a) have a notification time of six hours or less and (b) are able to be called at least ten times per year in order to receive 100% capacity credit, starting with the 2023/24 delivery year (programs that can be called between five and nine times will receive 80% capacity credit). We have designed all programs in this potential study for NIPSCO to nominate as LMRs, assuming 100% capacity credit.[1] The new requirements are summarized in Figure 2-1 below.

[1] For instance, the C&I load curtailment programs are assumed to provide participants with a day-of notification, as opposed to a day-ahead notification.

FIGURE 2-1 MISO LMR QUALIFICATION CRITERIA[2]



2.2 HISTORICAL DEMAND RESPONSE PROGRAMS AND RATE 831

Prior to NIPSCO's rate case in 2018, NIPSCO's demand response portfolio was comprised of load curtailment agreements from a small number of large industrial customers.[3] NIPSCO was responsible for procuring capacity to meet the full peak loads of these customers, but also offered a substantial portion of these loads to MISO as LMRs to help satisfy these capacity requirements. With the 2018 rate case, NIPSCO must now procure only enough resources for a portion of these customers' loads (known as "firm" loads, approximately 170 MW in total). However, NIPSCO can no longer claim the remaining "non-firm" portion of these customers' loads – nearly 700 MW – as demand response. A new rate class 831 was created for these customers to reflect the new arrangement.

Thus, while NIPSCO now has a lower total load obligation than before the 2018 rate case, it also cannot claim any demand response from Rate 831 companies. The change to NIPSCO's demand response portfolio is important to keep in mind when making comparisons to NIPSCO's historical demand response offerings and prior potential studies. When these large industrial loads are not taken into account, the quantity of demand response as a percentage of the peak load forecast for the MAP and RAP scenarios are approximately 7% and 3% in 2043, respectively. However, when the full loads and demand response capabilities of Rate 831 customers are included in the peak load forecast and as demand response, the total quantity of demand response in NIPSCO's territory increases to nearly 30% of the peak load.

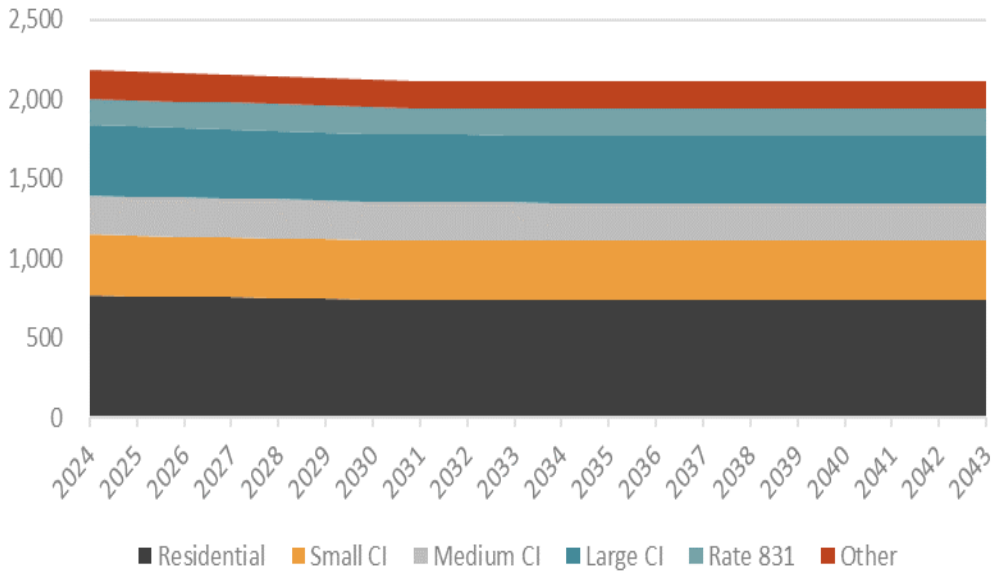
2.3 NIPSCO PEAK LOAD FORECAST

The peak load contribution of different NIPSCO customer classes is an important input to the demand response potential. NIPSCO provided the GDS team with a peak load forecast that distinguished between the firm load from Rate 831 customers and all other customer loads, and excludes Rate 831 non-firm loads. The peak load forecast was not broken out by customer type, so in order to develop different customer sectors' contribution to peak load, we used the actual historical 2019 peak load contribution for

[2] Image source: page 10 of MISO Filing in FERC docket ER20-1846 dated May 18, 2020.
[3] NIPSCO also previously offered a switch-based air conditioning direct load control program for the residential sector, but this was discontinued in 2015.

large customers (rate class 824 and above) and the demand cost allocation factors in the 2018 rate case final order for rate classes 823 and below.[4] The resulting disaggregated peak load forecast is shown in Figure 2-2. It is important to note that this forecast assumes energy efficiency programs continue at historical levels. This "EE first" perspective ensures that the same kW cannot be reduced twice by energy efficiency and demand response.[5] This forecast differs from the peak load forecast used for the IRP, which removes future additional energy efficiency programs (because new energy efficiency programs will be a selectable resource for optimization modeling).

FIGURE 2-2. STUDY FIRM PEAK LOAD FORECAST, 2024 THROUGH 2043



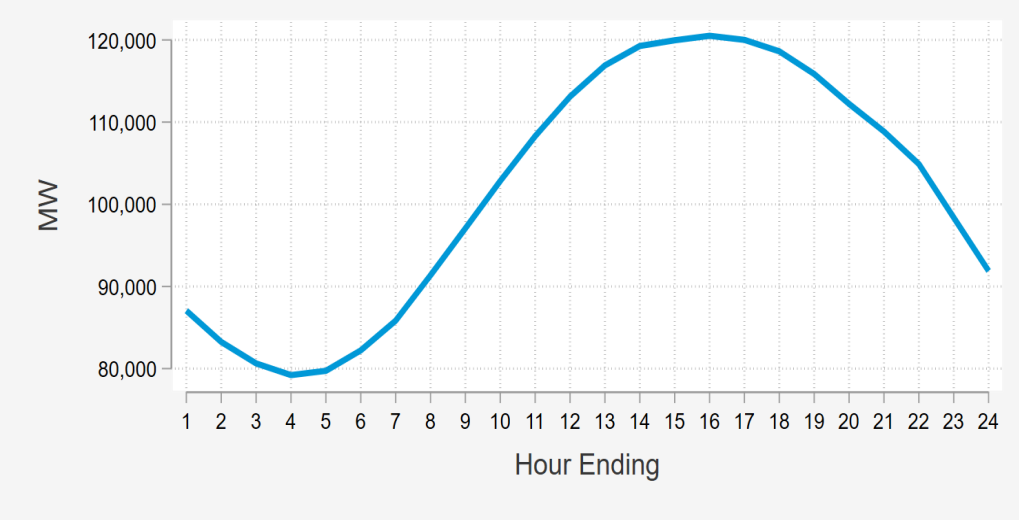
2.4 CHARACTERIZATION OF PEAK LOADS

The primary use case for demand response resources considered in this study is to reduce energy supply requirements on high-demand days. Because the season, timing, and duration of peak loads can impact the ability of demand response resources to deliver peak load reduction, it is important to characterize the peak demand according to the following dimensions:

- ***Timing and duration of peak.*** The MISO system, of which NIPSCO is a member, has historically peaked between 2 p.m. and 6 p.m., with peaks being relatively long (broad) in duration. Figure 2-3 shows the MISO load on July 19, 2019, MISO's peak load day of that year. Large amounts of additional solar could result in more of a "duck curve" net load shape, which shifts the net peak load back by several hours.

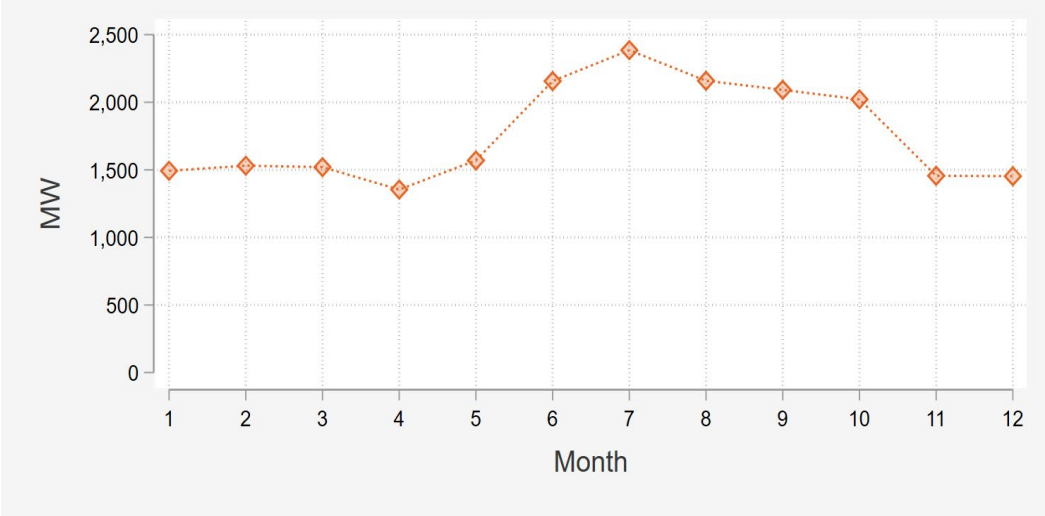
[4] Available for download at https://www.in.gov/oucc/electric/key-cases-by-utility/nipsco-electric-rates/nipsco-electric-rate-case-20182019/. The demand cost allocation factors are shown on page 158.
[5] The peak load forecast used for the demand response study is different than the one used for the energy efficiency study; unlike the EE energy and demand forecast, this study's forecast does not remove "naturally occurring" energy efficiency.

FIGURE 2-3. 2019 MISO PEAK LOAD DAY HOURLY SHAPE (JULY 19)



- ***Season of peak.*** Figure 2-4 shows the twelve historical monthly peak loads for the NIPSCO system in 2019. The NIPSCO system has historically been summer-peaking, with summer loads that are roughly 1,000 MW higher than winter loads. At least in the near term, loads will continue to peak during the summer over the study horizon.

FIGURE 2-4. 2019 NIPSCO FIRM PEAK LOAD BY MONTH



Given the large difference in winter and summer loads and the current timing of peak loads for NIPSCO and MISO, this demand response potential study focuses on DR capability for summer weekday afternoons and early evenings. It is possible that under certain scenarios, especially those featuring high levels of solar and widespread end-use electrification, NIPSCO could experience high net peak loads in the winter during the morning hours, and it will be important for NIPSCO to continue to monitor gross and net peak load trends. However, because the majority of demand response costs are recurring, and summer peaks are still likely to occur in these scenarios, the demand response programs modeled in this study should still be useful methods to meet NIPSCO reserve margin requirements. At the same time, additional analysis focused on winter demand response resources may be warranted in future potential studies and integrated resource planning efforts.

3 Economic Modeling Framework

This section describes the cost-effectiveness test the GDS team used in this study and the conceptual background behind the two types of potential (MAP and RAP) presented in this report.

3.1 UTILITY COST TEST

Demand response programs can be evaluated using various cost-effectiveness tests. The GDS team used the utility cost test (UCT) to evaluate NIPSCO's demand response options. For each program, we calculated the UCT by comparing the net present value of that program's costs to the net present value of that program's benefits over the study period of 2024-2043. A UCT ratio greater than 1.0 indicates that the program benefits exceed the costs (and the program is therefore cost-effective). Table 3-1 summarizes the costs and benefits components for the UCT. The avoided generation cost is based on a natural gas combined cycle reference unit. In Section 6, we present results for an alternate avoided cost case in which the avoided cost of generation capacity is reduced to $80/kW-yr in 2024. Table 3-2 contains other key assumptions, including the discount rate, inflation rate, and analysis period. Note that the UCT does not include benefits to society at large, such as avoided emissions, though avoided emissions for DR are relatively minor given that DR resources are dispatched relative infrequently.

TABLE 3-1 SUMMARY OF COSTS AND BENEFIT COMPONENTS

Type	Component
Costs	Program equipment costs
	Program labor costs
	Program marketing costs
	Other program operations and maintenance costs
Benefits	Avoided capacity costs[6]

TABLE 3-2. UTILITY COST TEST KEY PARAMETERS

Parameter	Value	Source
Nominal Discount Rate	6.38%	NIPSCO
Inflation Rate	2.10%	
Analysis Time Period	20 years (2024-2043)	
Avoided Generation Costs[7]	$129/kW-yr in 2024	
Avoided Transmission Costs	$7/kW-yr in 2024	
Avoided Distribution Costs[8]	$28/kW-yr in 2024	
Line Losses	4.11% Residential, 3.76% Medium Non-Residential, 2.41% Large Non-Residential	

[6] Avoided energy costs are not included in this study because of the low assumed annual hours of dispatch (24 hours per year) and the lack of time-differentiation in the avoided energy costs used for this study (i.e., the on-peak and off-peak avoided cost per kWh provided by NIPSCO were the same). Avoided energy costs associated with DR dispatch will, however, be captured in IRP modeling.

[7] Section 6 contains results for an alternate avoided cost scenario in which the avoided cost of generation capacity is set to $80/kW-yr.

[8] The Large C&I load curtailment program benefits do not include avoided distribution benefits because these customers are assumed to take service at the primary level.

Figure 3-1 summarizes the main inputs used to calculate UCT ratios and DR potential. Five key factors affect the cost-effectiveness of demand response programs:

1. ***The amount of load reduction (in kW) offered by each participant:*** Load reductions must be sufficiently high to produce program net benefits. All else equal, higher load reductions result in higher potential.
2. ***The avoided capacity costs:*** Avoided generation capacity costs comprise the majority of demand response benefits in this analysis, followed by avoided distribution and transmission costs. The total avoided cost is $164/kW-yr in 2024. As discussed above, the total avoided cost in 2024 for the alternate case is $115/kW-yr.
3. ***The amount of capacity enrolled in each program by year:*** Program enrollment affects the level of aggregate benefits for each program and whether the program is cost-effective when including overhead costs. The amount of capacity reflects line losses and assumed event opt-outs.
4. ***The fixed and variable costs of each program:*** Variable costs, including the costs of equipment and installation, marketing, and labor, must be less than per-customer benefits for the program to be cost-effective at the margin. Fixed costs are not affected by program size, but factor into cost-effectiveness.
5. ***Key financial assumptions:*** Assumptions such as the discount rate and analysis period affect program potential.

FIGURE 3-1: METHODOLOGY SUMMARY

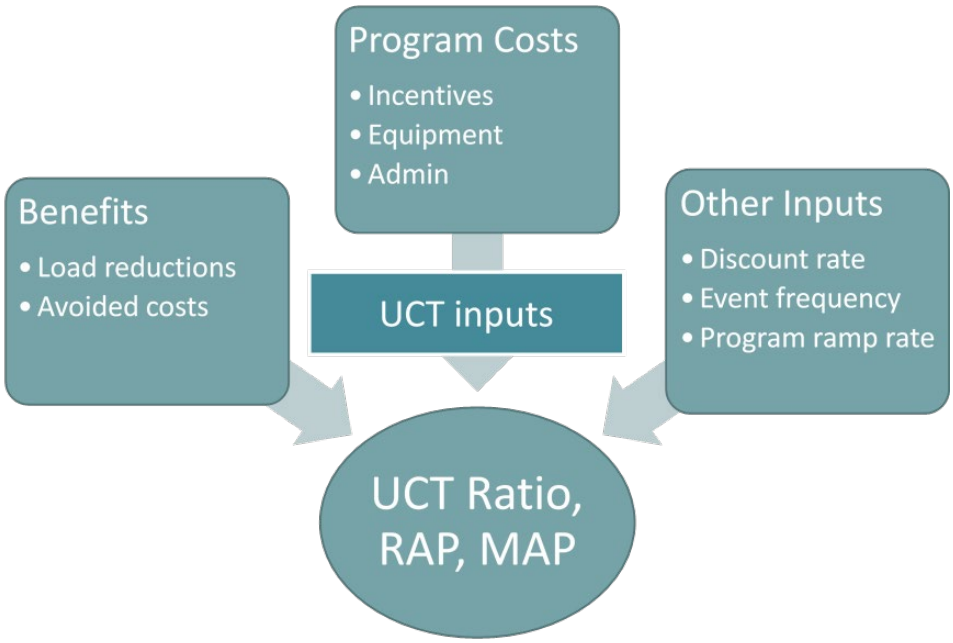


Table 3-3 summarizes the possible cost categories for each program. Costs are categorized as either fixed or volumetric – based on whether they scale directly with program enrollments – and are incurred on either a one-time or a recurring basis. For instance, annual incentive payments to participating customers are volumetric recurring costs because they are paid to each participant each year. Equipment and installation costs, on the other hand, are volumetric one-time costs because they are incurred only when a new customer enrolls in a DR program. Marketing costs are described in more detail within each section, as are "other" costs, which are specific to each program. Because NIPSCO does not have existing demand response offerings for many of these programs, cost estimates were developed based on the GDS teams' review of other studies and current demand response product marketing.

TABLE 3-3. COST CATEGORIZATION

Component	Cost Type	Cost Frequency
Equipment	Volumetric	One time
Installation Labor	Volumetric	One time
Other One-Time Costs	Volumetric	One time
Support Labor	Fixed	Recurring
	Volumetric	
Sign-Up Incentive	Volumetric	One time
Annual Incentive	Volumetric	Recurring
Other Direct Costs	Volumetric	Recurring

3.2 MAXIMUM ACHIEVABLE POTENTIAL AND REALISTIC ACHIEVABLE POTENTIAL

This report presents two estimates of potential—***MAP*** and ***RAP***—that correspond to different perspectives of program costs and benefits. For each program, the ***maximum achievable potential (MAP)*** represents more aggressive assumptions around incentives and program design, which in turn drives higher participation. Therefore, MAP scenarios have higher total demand response potential, but also higher costs. Only programs with UCT greater than or equal to 1.0 are included in MAP. The ***realistic achievable potential (RAP)*** represents more "middle-ground" assumptions around program incentives and design. RAP scenarios have lower total demand response potential but are more cost-effective than the MAP scenarios, mainly because of lower program incentives. [9] Each program is also assumed to have a ramp rate, reaching full program capacity after two or three years, which reflects time required to market to and enroll customers in each program.

We also report levelized costs for each program, denoted in terms of real 2024 dollars per kW-year (2024$/kW-yr). The levelized cost of a resource is the present-value cost of the program per kW acquired over the study horizon. It accounts for differences in when costs are incurred and when DR programs deliver capacity, and facilitates comparisons within DR programs and to other capacity resources. Programs with lower levelized costs will have higher UCT ratios, while programs with higher levelized costs will have lower UCT ratios.

[9] The one exception to this relationship are the residential and small non-residential dynamic rate programs, in which the MAP scenario is designed as an opt-out (default) program and the RAP scenario is defined as an opt-in scenario. The RAP opt-in scenario is higher cost because of the need to provide participation incentives. See the dynamic rates program sections for more detail.

4 Detailed Findings: Residential Sector

Table 4-1 shows the MAP and RAP by residential program for select years within the study horizon. The 20-year MAP across the three residential programs totals 61 MW and the RAP totals 19 MW. For both MAP and RAP, the Residential Smart Thermostat and the Residential Dynamic Rates programs were cost-effective while the Water Heater Direct Load Control program did not pass the cost-effectiveness test, resulting in no demand response capacity. The following sections present the methodology and results for the three residential programs considered in this study:

- Residential Smart Thermostat
- Residential Dynamic Rates (Critical Peak Pricing)
- Water Heater Direct Load Control

TABLE 4-1. RESIDENTIAL MAXIMUM AND REALISTIC ACHIEVABLE POTENTIAL BY PROGRAM (CUMULATIVE BY YEAR)

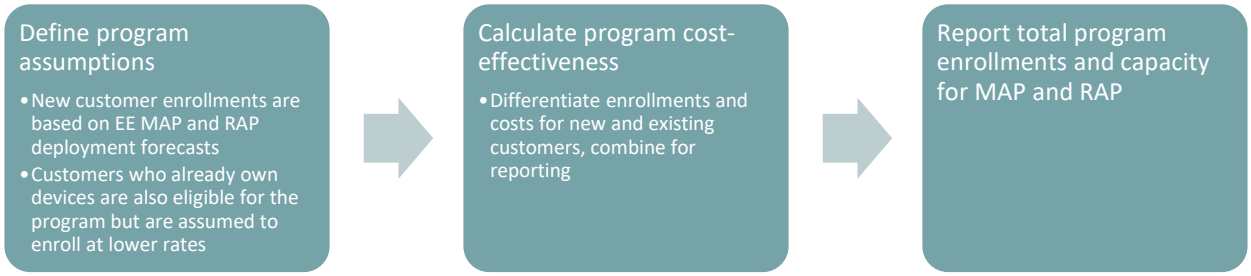
Program	MAP					RAP				
	2024	2025	2026	2033	2043	2024	2025	2026	2033	2043
Residential Smart Thermostat	7	8	9	19	37	4	4	4	5	8
Water Heater Direct Load Control	0	0	0	0	0	0	0	0	0	0
Residential Dynamic Rates (CPP)	0	0	0	24	24	0	0	0	10	11
Total [a]	**7**	**8**	**9**	**43**	**61**	**4**	**4**	**4**	**15**	**19**

[a] Total row may not equal the sum of program values due to rounding

4.1 RESIDENTIAL SMART THERMOSTAT PROGRAM

Smart thermostat programs achieve peak demand reductions by allowing the utility to control residential customers' air conditioning use on a limited number of days per year. The GDS team designed the Residential Smart Thermostat program as an add-on to the energy efficiency smart thermostat programs: when purchasing a new smart thermostat, customers would be able to receive an additional rebate, on top of the standard energy efficiency rebate, in exchange for enrolling in the NIPSCO demand response program. For internal consistency, the MAP and RAP demand response apply an assumed enrollment rate to the corresponding energy efficiency MAP and RAP smart thermostat deployment forecasts to arrive at a final participant enrollment count for each scenario. The process is summarized below in Figure 4-1.

FIGURE 4-1: RESIDENTIAL SMART THERMOSTAT PROGRAM METHODOLOGY SUMMARY



4.1.1 Program Assumptions

We divided program assumptions into two key categories: cost assumptions and non-cost assumptions. Cost assumptions include those about equipment, incentives, and program overhead costs, while other non-cost assumptions include the assumed enrollment rates and demand reductions.

4.1.1.1 Cost Assumptions

The cost assumptions used for the Smart Thermostat program are shown in Table 4-2. Support labor includes the costs of establishing the program in year one and maintaining the program in subsequent years. Customer incentives are provided on an annual basis to participating customers, as opposed to on a one-time sign-up basis, to ensure continued participation, and are assumed to be $50 in the RAP scenario and $75 in the MAP scenario. We also assume a $35 recurring per-device cost associated with annual vendor fees for thermostat control. Finally, smart thermostat equipment costs are assumed to be $150 and are replaced by NIPSCO at no charge to the customer at the end of their useful life of 15 years, with all equipment failing at the end of 15 years for modeling simplicity.

TABLE 4-2. RESIDENTIAL AIR CONDITIONING COST ASSUMPTIONS

Component	Cost Type	Cost Frequency	RAP	MAP	Notes
Support Labor	Fixed	One time	$50,000	$50,000	Program startup costs
	Fixed	Recurring	$20,000	$20,000	Program maintenance costs
	Volumetric	One-time	$2	$4	Reflects minimal amount of marketing costs
Annual Incentive	Volumetric	Recurring	$50	$75	Assumed; drives enrollment rates below
API Costs	Volumetric	Recurring	$35	$35	
Equipment Costs	Volumetric	One time	$100	$100	Only used to calculate replacement costs for thermostats at end of useful life (15 years)

4.1.1.2 Other Program Assumptions

Other program assumptions are shown in Table 4-3. Below we provide notes on specific program assumptions:

- ***Reference cooling loads:*** Because we did not have detailed data for NIPSCO, reference cooling loads (1.44 kW) were taken from the Pennsylvania Act 129 Phase IV Demand Response Potential

Study.[10] This reference cooling load was calculated from smart thermostat manufacturer ecobee's Donate Your Data initiative for approximately 9,000 customers in Pennsylvania, New York, Ohio, Connecticut, New Jersey, Maryland, West Virginia, and Delaware. A peak cooling load of 1.44 kW represents approximately 73% of the average peak load contribution of NIPSCO's residential customer class. Section 4.3 provides additional detail on our derivation of the whole home residential peak load contribution.

- ***Cooling load reduction:*** We assumed that cooling loads are reduced by 70% per event, or approximately 1.0 kW at the customer meter. Recent impact evaluations of smart thermostat demand response impacts have found reductions of similar magnitude.
- ***Enrollment rates:*** For the RAP scenario ($50 incentive) and MAP scenario ($75 incentive), we assume an enrollment rate of 20% for customers purchasing a new smart thermostat and 10% for customers who already own a smart thermostat in the NIPSCO service territory.

TABLE 4-3. RESIDENTIAL AIR CONDITIONING NON-COST ASSUMPTIONS

Parameter	Input	Units	Notes/Source
Single family home reference cooling load	1.443	kW	For summer peak period, from PA DR MPS based on ecobee thermostat data
Multifamily home adjustment factor	99.0%	%	Weighted average of MF and SF homes from NIPSCO data (MF homes assumed to have lower cooling loads)
Load reduction per device	70%	% of cooling load	Expected peak reduction during the period June through August during the hours from 2:00 pm through 6:00 pm.
Load reduction per device – at meter	1.000	kW	SF reference load * MF adjustment factor * % Impact
Event opt-out rate	10%	% of all customers	Assumed
Load reduction per device – at system level, i.e. w/ losses and opt-outs	0.939	kW	Load reduction per device for program = Reference load * % Impact * (1-opt-out rate) / (1-losses)
Effective useful life (EUL)	15	years	IN TRM; used to determine replenishment costs at end of EUL
Annual event hours	24	hours/year	Six 4-hour events per year
2020 smart thermostat market saturation	8.0%	%	Weighted average of MF and SF homes from NIPSCO data
Enrollment rate – customers with existing smart thermostats	10% RAP / 15% MAP	%	Based on $50 incentive
Enrollment rate – customers purchasing new smart thermostats	20% RAP / 30% MAP	%	Based on $75 incentive
Year-over-year attrition rate	10%	% of customers	Assumed

[10] Page 50 of Pennsylvania Act 129 - Phase IV Demand Response Potential Study. https://www.puc.pa.gov/pcdocs/1656475.pdf. The final cooling load of 1.44 kW is the average of the ten deciles presented in the report.

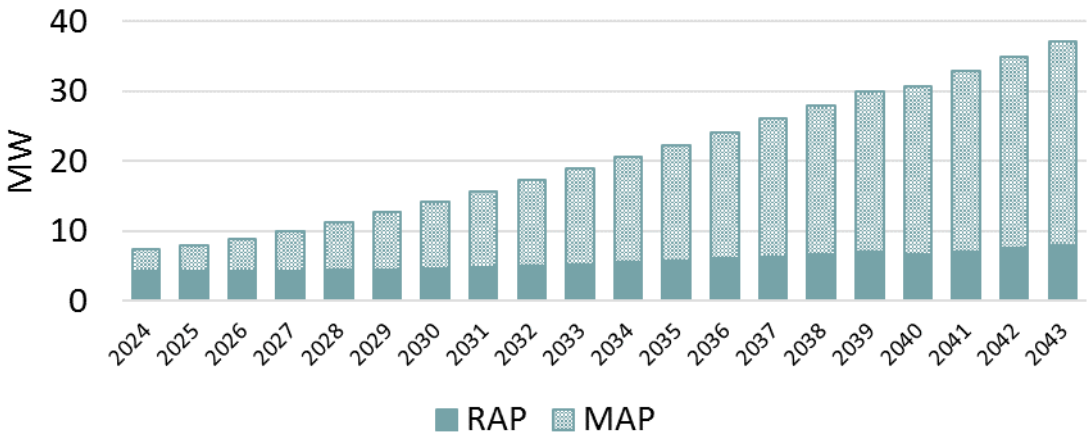
4.1.2 Cost-Effectiveness Results

Table 4-4 summarizes the cost-effectiveness results. Both the RAP and MAP scenarios have UCT ratios well above 1, indicating that both are cost-effective. Figure 4-2 shows the trajectory of the program over time for the RAP and MAP scenarios. Both the RAP and MAP scenarios ramp up over time as the market share of smart thermostats increases. However, the MAP scenario achieves a much higher demand response capacity for two reasons. First, the underlying MAP smart thermostat device forecast, from the EE potential study, is higher than the RAP scenario. Second, the MAP scenario is modeled using a higher incentive and thus a higher enrollment rate. Combined, the MAP scenario is over four times as high as the RAP scenario in 2043, though the RAP scenario is slightly more cost effective than the MAP scenario. The total RAP and MAP demand response capacities are 8 and 37 MW in 2043, respectively.

TABLE 4-4: RESIDENTIAL SMART THERMOSTAT PROGRAM COST-EFFECTIVENESS RESULTS

Parameter	RAP	MAP
20-year NPV of Benefits (Thousand 2024$)	$12,348	$42,322
20-year NPV of Costs (Thousand 2024$)	$7,257	$31,085
UCT Ratio	1.70	1.36
Devices in 2043	8,435	39,446
System Level Capacity in 2043 (MW)	7.9	37.0
Levelized Costs (2024$kW/yr)	$97.20	$121.55

FIGURE 4-2: RESIDENTIAL SMART THERMOSTAT PROGRAM RAP AND MAP BY YEAR



4.2 WATER HEATER DIRECT LOAD CONTROL PROGRAM

The electric water heater direct load control program would rely on Wi-Fi-connected switches to control the electric water heater loads of participating customers for several events per year. These programs have been implemented by utilities across the U.S., typically in southeastern and northwestern parts of the country, which feature higher levels of electric water heating.

4.2.1 Program Assumptions

As with prior sections, we divided program assumptions into two key categories: cost assumptions and non-cost assumptions. Unlike all other programs, the RAP and MAP scenarios are identical for the Water Heater Direct Load Control program. This is because the RAP scenario, which was developed before the MAP scenario, was not cost-effective, and the MAP scenario (which would feature a higher incentive level and therefore lower UCT ratio) would also not be cost-effective. We therefore set the MAP scenario to be equal to the RAP scenario for simplicity.

4.2.1.1 Cost Assumptions

Table 4-5 shows the cost assumptions for the Water Heater Direct Load Control program. Support labor includes the costs of establishing and maintaining the smart thermostat program. The sum of the switch equipment and installation costs is $220, and we assume an annual incentive of $25 per device. Finally, we assume one-time volumetric costs of $5 to account for minimal amounts of marketing the program.

TABLE 4-5. WATER HEATER DIRECT LOAD CONTROL COST ASSUMPTIONS

Component	Cost Type	Cost Frequency	RAP/MAP	MAP	Notes
Support Labor	Fixed	One time	$50,000	$50,000	Program startup costs
	Volumetric	Recurring	$20	$20	Annual program maintenance costs
	Volumetric	One-time	$5	$5	Reflects small amount of marketing
Annual Incentive	Volumetric	Recurring	$25	$25	
Equipment Costs	Volumetric	Recurring	$120	$120	Based on recent program cost data from water heater load control programs in California and South Carolina
Installation Costs	Volumetric	One time	$100	$100	

4.2.1.2 Other Program Assumptions

Table 4-6 shows the key non-cost program assumptions. Some additional detail around these assumptions is provided below:

- ***Number of eligible devices:*** Because NIPSCO service territory has a mix of electric and fossil-fuel-fired heaters, only a portion of customers would be eligible to participate. In particular, NIPSCO appliance surveys show that 12.8% of electric customers have electric water heaters and 92% of those water heaters feature tanks. As a result, approximately 49,000 electric accounts are eligible for the water heater direct load control program, and only a fraction of those would enroll.
- ***Enrollment rate:*** For a $25 annual incentive, we assume that 15% of all eligible devices enroll in the program, for a total of approximately 7,400 devices.
- ***Per-device demand reduction:*** One of the most important assumptions is the per-participant demand reduction. Because no data were available that directly applied to NIPSCO, the GDS team reviewed verified summer demand response load impacts from water heater direct load control programs in other jurisdictions, summarized in Figure 4-3 and taken from a prior

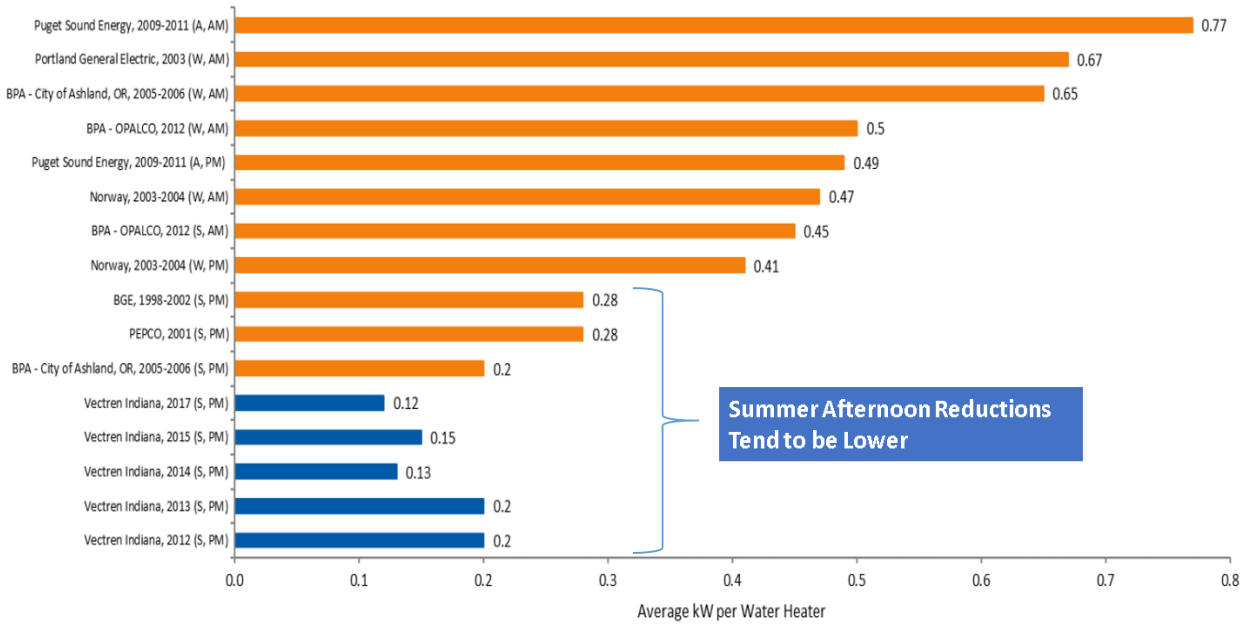
evaluation of water heater demand response impacts. Demand reductions for summer afternoon events are lower than for winter and morning events, because water heaters use less energy on summer afternoons. Based on this review, the team assumed a summer demand reduction of 0.3 kW per participant, the upper range from industry benchmarking.

- ***Program attrition:*** No program attrition is assumed given a lack of data on this metric and the fact that water heaters are less visible devices. However, any attrition rate above zero will reduce the cost-effectiveness of the program.

TABLE 4-6: WATER HEATER DIRECT LOAD CONTROL OTHER ASSUMPTIONS

Component	Value	Source/Notes
Eligible devices	49,268	Based on existing penetration of electric tank water heaters in NIPSCO service territory.
Load reduction per device	0.3 kW at meter	Based on review of other summer afternoon water heater direct load control impacts
Enrollment rate	15%	The enrollment rate helps to determine the program size but has almost no impact on cost-effectiveness
Expected useful life	10 years	Indiana TRM (heat pump water heater)

FIGURE 4-3. VERIFIED DEMAND REDUCTION JURISDICTIONAL REVIEW FOR WATER HEATER DIRECT LOAD CONTROL PROGRAMS



4.2.2 Cost-Effectiveness Results

Table 4-7 summarizes the cost-effectiveness results. Under the program assumptions described above, the water heater direct load control program had a UCT ratio of 0.66 and was therefore not cost-effective, and the MAP and RAP demand response quantity is zero. The program UCT ratio would exceed 1.0, however, if the average demand reduction were 0.46 kW and all other assumptions were held constant. Figure 4-4 shows that while water heater loads are relatively low during the summer afternoon window that this study is focused on (2-6pm), water heaters could be a cost-effective method for reducing loads at other times, such as summer evenings or winter mornings. Nonetheless, the total demand response

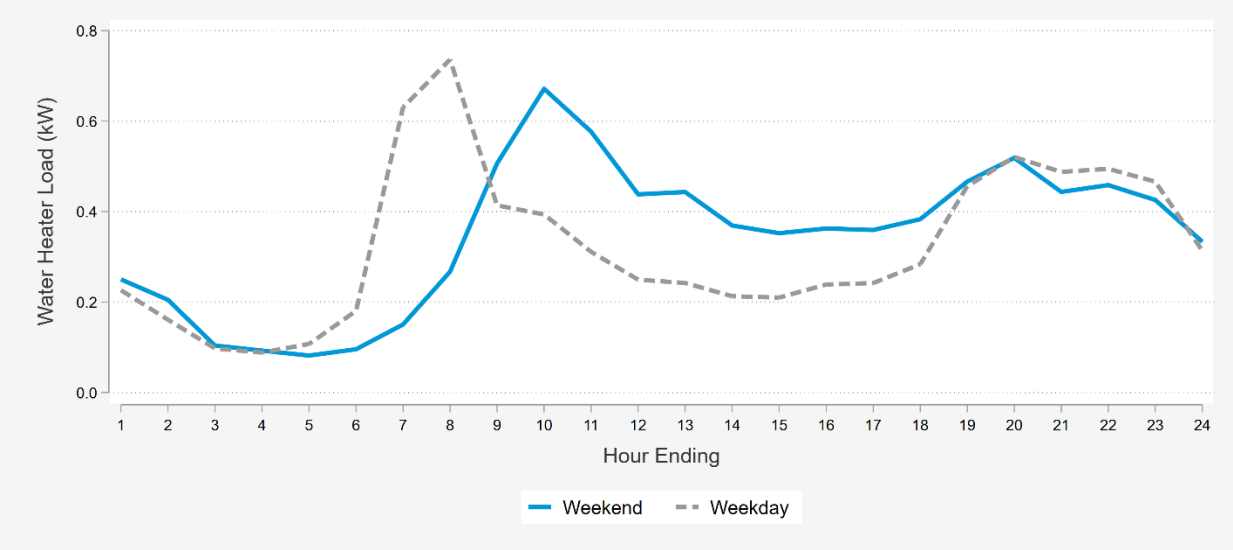
capacity associated with water heaters would still be fairly limited because of low electric water heater equipment saturation in the NIPSCO territory. The total size of the program, under our base assumptions of a 15% enrollment rate and a 0.3 kW load reduction, is 2.3 MW. Using more aggressive assumptions of 0.5 kW and a 20% enrollment rate would bring the total size of the program to 5 MW. However, additional electrification of water heating or more aggressive incentive levels and enrollment rates would further increase possible program size.

TABLE 4-7: WATER HEATER DIRECT LOAD CONTROL PROGRAM COST-EFFECTIVENESS RESULTS

Parameter	RAP	MAP
20-year NPV of Benefits (Thousand 2024$)	$5,323	$5,323
20-year NPV of Costs (Thousand 2024$)	$8,059	$8,059
UCT Ratio	0.66	0.66
Devices in 2043[a]	0	0
System Level Capacity in 2043 (MW) [a]	0.0	0.0
Levelized Costs (2024$kW/yr)	$250.35	$250.35

[a] Potential is zero because UCT ratio is below 1.0.

FIGURE 4-4: WATER HEATER LOAD SHAPE



4.3 RESIDENTIAL DYNAMIC RATES (CRITICAL PEAK PRICING) PROGRAM

Dynamic rates provide an economic incentive for customers to reduce electricity usage during high-system-cost periods. The program considered for this study is known as Critical Peak Pricing (CPP). CPP programs offer participants a discounted electricity rate during off-peak hours, but charge customers a much higher energy price during a limited number of events that are called by NIPSCO. Because NIPSCO has not yet installed enabling advanced metering infrastructure (AMI), which would permit the widespread adoption of dynamic rates, for this study we assumed a dynamic rates program beginning in 2030. We assume the rates would be designed to be revenue-neutral for NIPSCO.

In addition, we designed the MAP scenario as an opt-out (default) program and the RAP scenario as an opt-in program. Unlike all other programs in this study, the MAP scenario is lower cost than the RAP scenario in this study because of the need to offer a participation incentive in the RAP scenario but not in the MAP scenario. The cost and non-cost assumptions for the Residential Dynamic Rates program are shown below.

4.3.1 Program Assumptions

4.3.1.1 Cost Assumptions

Table 4-8 shows the cost assumptions for the Residential Dynamic Rates program. The first two rows capture the costs of setting up and maintaining billing software, which is more complicated than flat-rate billing systems. The only other assumed cost is a $25 incentive for the RAP opt-in scenario. As discussed above, the incentive cost is zero for the MAP scenario because the dynamic pricing program is opt-out by design. Importantly, these costs do not represent the full costs of AMI equipment and deployment, which can amount to over $1,000 per meter and result in UCT ratios for the dynamic rate programs that are the highest in this study. We did not include the full costs of AMI in the UCT ratio because no dynamic rates demand response program would be cost-effective if it had to bear the full costs of AMI deployment. Rather, benefits from a dynamic rates demand response program should be weighed with other benefits of AMI – such as reduced outage times and better system visibility – in a more comprehensive manner when AMI deployment is being considered.

TABLE 4-8. RESIDENTIAL DYNAMIC RATES COST ASSUMPTIONS

Component	Cost Type	Cost Frequency	RAP	MAP	Notes
Support Labor	Fixed	One time	$250,000	$1,000,000	Incremental billing system startup costs
	Fixed	Recurring	$250,000	$250,000	Incremental billing system operational costs
Signup Incentive	Volumetric	Recurring	$25	$0	MAP incentive is zero because dynamic pricing program is opt-out (default)

4.3.1.2 Other Program Assumptions

Other program assumptions are shown in Table 4-9. There are several notes on particular program assumptions:

- ***Reference loads:*** Reference loads were assumed to be 1.97 kW for residential customers. We obtained this value by multiplying the 2019 peak load by the rate class demand cost allocation factor in the 2018 rate case (35%) and dividing by the number of 2021 residential electric accounts forecast (roughly 421,000).
- ***Load reduction:*** We assumed a 12% whole-premise load reduction for RAP opt-in customers and 3% load reduction for the MAP opt-out scenario. The RAP load reduction percentage was based on the Arcturus model from The Brattle Group, which uses compiled evaluation results from dozens of dynamic rates programs to develop a relationship between the load reduction percentage and the rate price differential, which we assume would be 300%.[11] The MAP

[11] https://www.brattle.com/news-and-knowledge/publications/arcturus-20-a-meta-analysis-of-time-varying-rates-for-electricity.

scenario assumed load reduction is only 3%. The result is a meter-level impact of 0.24 kW for the RAP scenario and 0.06 kW for the MAP scenario.

- ***Enrollment rate:*** With a $25 sign-up incentive (RAP scenario), we assume an enrollment rate of 10%. The MAP enrollment rate is assumed to be 98%, based on a small number of opt-outs.
- ***Attrition rate:*** A high program attrition rate can have a negative effect on program cost-effectiveness. We assume a 15% attrition rate per year for the RAP scenario, based on program data for a similar program from a Midwest utility.
- ***Program start year:*** As discussed above, we assume that AMI infrastructure is put into place before 2030, when we assume the dynamic rate program takes effect.

TABLE 4-9. RESIDENTIAL AIR CONDITIONING NON-COST ASSUMPTIONS

Component	RAP	MAP	Units	Notes/Source
Rates start year	2030	2030	Year	Enabling AMI not currently in place
Per-Premise kW reference load	1.97	1.97	kW	Calculated based on residential sector share of 2019 NIPSCO peak load, using 2018 rate case cost allocation factors
Rate price differential (hi/low)	300%	300%	%	
Load Reduction % Impact	12%	3%	%	RAP opt-in rate based on The Brattle Group Arcturus model; MAP per-customer impacts are assumed to be 1/4 as high
EUL	20	20	Years	
Enrollment rate	10%	98%	%	
Per-Premise Reduction (at meter)	0.242	0.061	kW	Load reduction per device at meter = Reference load * % Impact
Event opt-out rate	10%	10%	% of customers	
Year-over-year attrition rate	15%	0%	% of customers	Based on Consumers Energy dynamic rates attrition rate
Per-Premise Reduction (at system, i.e. w/ losses and opt-outs)	0.227	0.057	kW	Load reduction per device for program = Reference load * % Impact * (1-opt-out rate) / (1-losses)

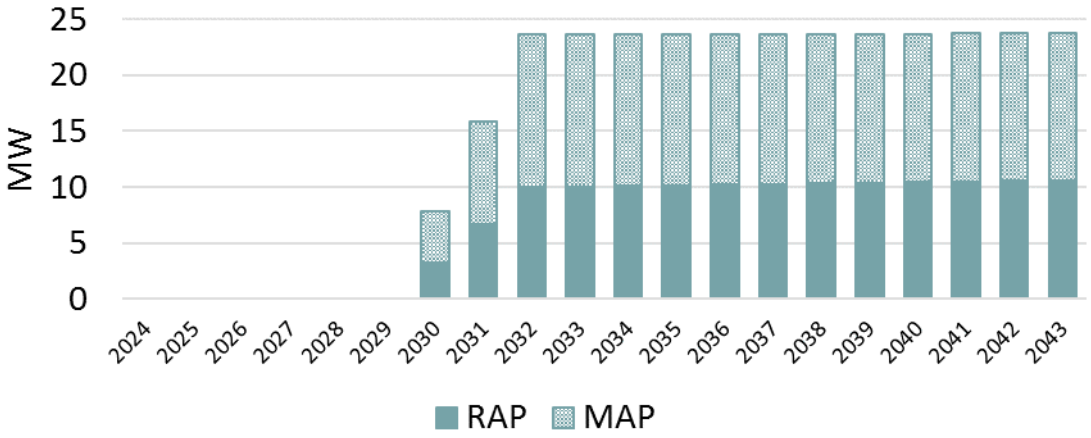
4.3.2 Cost-Effectiveness Results

Table 4-10 summarizes the cost-effectiveness results, while Figure 4-5 shows the program capacity over time for the RAP and MAP scenarios. The cost-effectiveness results for the Residential Dynamic Rates should be interpreted with two key considerations in mind: first, enabling AMI infrastructure is not currently in place that would render these programs feasible in the near term, and so the assumed start date for this program is in 2030; second, these values exclude the majority of costs that would be incurred to deploy AMI in the NIPSCO territory. The UCT ratios for both the RAP and MAP scenarios are quite high, in part due to the exclusion of most AMI costs. In addition, the MAP scenario capacity is roughly twice as large as the RAP scenario, as the opt-out program design, enrolling nearly ten times as many participants as the RAP opt-in scenario, is offset by lower per-participant impacts. The total RAP and MAP demand response capacities are 11 and 24 MW in 2043, respectively.

TABLE 4-10: RESIDENTIAL DYNAMIC RATES PROGRAM COST-EFFECTIVENESS RESULTS

Parameter	RAP	MAP
20-year NPV of Benefits (Thousand 2024$)	$13,098	$30,281
20-year NPV of Costs (Thousand 2024$)	$4,162	$2,710
UCT Ratio	3.15	11.17
Devices in 2043	46,634	417,571
System Level Capacity in 2043 (MW)	10.6	23.7
Levelized Costs (2024$/kW-yr)	$52.62	$14.82

FIGURE 4-5: RESIDENTIAL DYNAMIC RATES PROGRAM RAP AND MAP BY YEAR



5 Detailed Findings: Non-Residential Sector

Table 5-1 shows the MAP and RAP by non-residential program for select years within the study horizon. The 20-year MAP across the three non-residential programs totals 75 MW and the RAP totals 38 MW. The Large C&I Load Curtailment program comprises the majority of demand response capacity in both the MAP and the RAP scenarios, followed by the Medium C&I Load Curtailment and Small C&I Dynamic Rates programs. The following sections present the methodology and results for the non-residential programs considered in this study:

- Non-Residential Load Curtailment (both Medium and Large C&I customer sectors)
- Small C&I Dynamic Rates (Critical Peak Pricing)

TABLE 5-1. NON-RESIDENTIAL MAXIMUM AND REALISTIC ACHIEVABLE POTENTIAL BY PROGRAM (CUMULATIVE BY YEAR)

Program	MAP					RAP				
	2024	2025	2026	2033	2043	2024	2025	2026	2033	2043
Small C&I Dynamic Rates (Critical Peak Pricing)	0	0	0	12	13	0	0	0	5	5
Medium C&I Load Curtailment	3	4	6	7	7	2	2	3	4	4
Large C&I Load Curtailment	23	35	46	55	55	12	19	25	29	29
Total [a]	**26**	**39**	**52**	**75**	**75**	**14**	**21**	**28**	**37**	**38**

[a] Total row may not equal the sum of program values due to rounding

5.1 NON-RESIDENTIAL LOAD CURTAILMENT

Load curtailment is a class of demand response programs where customers agree to reduce load upon request in exchange for a financial incentive, which can be tariff-based or a supplemental payment contract:

- ***Tariff-Based:*** Participants are assigned to a tariff with more favorable billing determinants in exchange for agreeing to have a portion of their load interrupted or operations curtailed in response to direction from the utility or grid operator.
- ***Payment Contract:*** Participants enter a separate contract with the utility or grid operator to curtail load upon request. Generally, the program administrator will specify the dispatch parameters and participants will commit to reducing a certain amount of load upon dispatch for one or more years.

The GDS team modeled the non-residential load curtailment as a payment contract program. We created two distinct program sectors based on NIPSCO customer rate codes. The Medium C&I customer class includes Rate 823, while the Large C&I customer class includes rate classes 824, 825, 826, and 832. The Medium C&I peak load contribution is based on the 2018 rate case final order demand cost allocation factor of 11.42%, multiplied by the peak load forecast, while the Large C&I sector peak load

contribution is based on the actual 2019 contribution recorded by customer meters as a percentage of total peak load. The peak loads are 250 MW and 439 MW in 2024, respectively.[12]

5.1.1 Methodology

The load curtailment potential for non-residential customers is a function of several important factors. For our top-down model, the GDS team uses summer peak load forecasts as a foundation, with other relevant inputs that include financial variables (retail rates, avoided capacity costs, and avoided energy costs), customer sensitivity to changes in electricity price (demand response price elasticity), and components of the program design (frequency and duration of events and amount of notification time and incentive payments). Table 5-2 describes these assumptions, as well as the sources for other key inputs into the demand response potential estimates. Following the table is a discussion of the price elasticity of demand response supply and how it can be used to estimate load curtailment potential.

TABLE 5-2: SUMMARY OF NON-RESIDENTIAL CURTAILMENT INPUT ASSUMPTIONS AND SOURCES

Input Variable	Sources, Notes, and Assumptions
Retail Electricity Cost ($/MWh)	NIPSCO provided the residential, commercial, and industrial retail rates. We assigned the commercial rate to the Medium C&I customer group and the industrial rate to the Large C&I customer group. The values are $0.095 and $0.079 in 2024 in nominal dollars, respectively.
Avoided Cost of Capacity ($/kW-year)	NIPSCO provided the GDS team with avoided costs of generation, transmission, and distribution capacity. The total avoided cost of capacity in nominal dollars is $164/kW-yr in 2024, applied to the Medium C&I sector. The avoided cost of capacity for Large C&I customers is $136/kW-yr in 2024 and excludes avoided distribution costs.
Avoided Energy Costs ($/MWh)	Avoided energy costs represent the difference between the summer on-peak and summer off-peak periods. As with other sectors, we did not model any differential between energy costs because the on and off-peak prices provided by NIPSCO were the same values.
Program Design (number and duration of events, notification level)	The team assumed an average of 24 event hours per summer across the study horizon. Larger event hour averages lead to lower potential estimates. For our load curtailment potential estimates, we assumed a *day-of* notification design, with a three- to six-hour notice, for consistency with recent MISO rulemakings, as discussed in Section 2. Potential would be higher under a *day-ahead* notification design, which provides participants with more opportunity to shift energy-intensive tasks to off-peak periods.
Peak Load Contribution	Based on demand cost allocation factor in the 2018 rate case final order for Medium C&I and actual 2019 peak load contributions for Large C&I sector, which amount to 250 MW and 439 MW in 2024, respectively.
Participant Incentive	For load curtailment programs, the GDS team modeled the incentive as an annual reservation payment provided to the participant. In exchange, the participant agrees to curtail load when events are dispatched. For RAP, we set the optimal incentive level using maximized net benefits, performing a simulation where the key input was the incentive level and the key output was the net benefit of the demand response program. The team leveraged several of the inputs discussed herein for this simulation and repeated it for each of the 20 years in the study horizon to establish different incentive levels by year. **Table 5-4** shows the incentive levels by year and modeling perspective.

[12] For the Large C&I customer sector, using the 2018 peak load contribution would result in a peak load contribution of 442 MW in 2024, while using the demand allocation factor in the 2018 rate case would yield a peak load of 475 MW.

Input Variable	Sources, Notes, and Assumptions
Price Elasticity of Demand Coefficients	We derived the price elasticity of demand coefficients from auction clearing results from the PJM Interconnection LLC (PJM) Reliability Pricing Model and from non-residential load curtailment evaluation results from Pennsylvania, California, and New Mexico. Additional details are included in the Price Elasticity section.
Program Management Budget (Non-Incentive Costs)	The team assumed three program management budget components: (1) We assumed that *fixed program management costs* start at $200,000 in 2024 and escalate annually. (2) We set the *marketing and customer acquisition costs* during the expansion period at $200,000 in 2024 and escalated annually until 2029 (after which there is no fixed cost for marketing and customer acquisition). (3) We set the *variable program administration costs*, the largest component that scales according to program size, using a 20% adder to the total incentive cost.
Line Losses	The team used a top-down model for the load curtailment opportunity using system loads, so the resulting estimates of demand response potential are inclusive of line losses.
Ramp Rate	To account for the program needing a few years to fully mature, the GDS team assumed a three-year ramp up to full program potential. We applied ramp rate factors of 40%, 60%, and 80% in the first three program years (2024-2026) respectively.

The GDS team produced estimates of both MAP and RAP, which are defined in the context of business load curtailment as follows:

- MAP is the load curtailment potential for a program where customer incentives are as high as possible while still producing a cost-effective program (that is, the largest incentive value such that the UCT ratio does not fall below 1.0).
- RAP is the load curtailment potential for a program where customer incentives are designed to maximize the present value of the net program benefits.

5.1.1.1 Price Elasticity

The price elasticity of demand is the ratio between the percentage change in the quantity of electricity demanded and the percentage change in the price (with and without an incentive) of demand response:

$$Elasticity = \frac{Percentage\ Change\ in\ Quantity}{Percentage\ Change\ in\ Price}$$

Where:

$$Percentage\ Change\ in\ Quantity = \frac{(Summer\ Peak - \ Demand\ Response\ Potential) - Summer\ Peak}{Summer\ Peak} * 100\%$$

$$Percentage\ Change\ in\ Price = \frac{(Retail\ Rate + Incentive\ Payment) - Retail\ Rate}{Retail\ Rate} * 100\%$$

We derived price elasticities from Table 58 of the Pennsylvania Act 129 Phase IV Demand Response Potential Study.[13] These values are replicated below in Table 5-3. As described in the Pennsylvania report, these price elasticity of demand coefficients are based on multiple years of DR performance data for

[13] https://www.puc.pa.gov/pcdocs/1656475.pdf

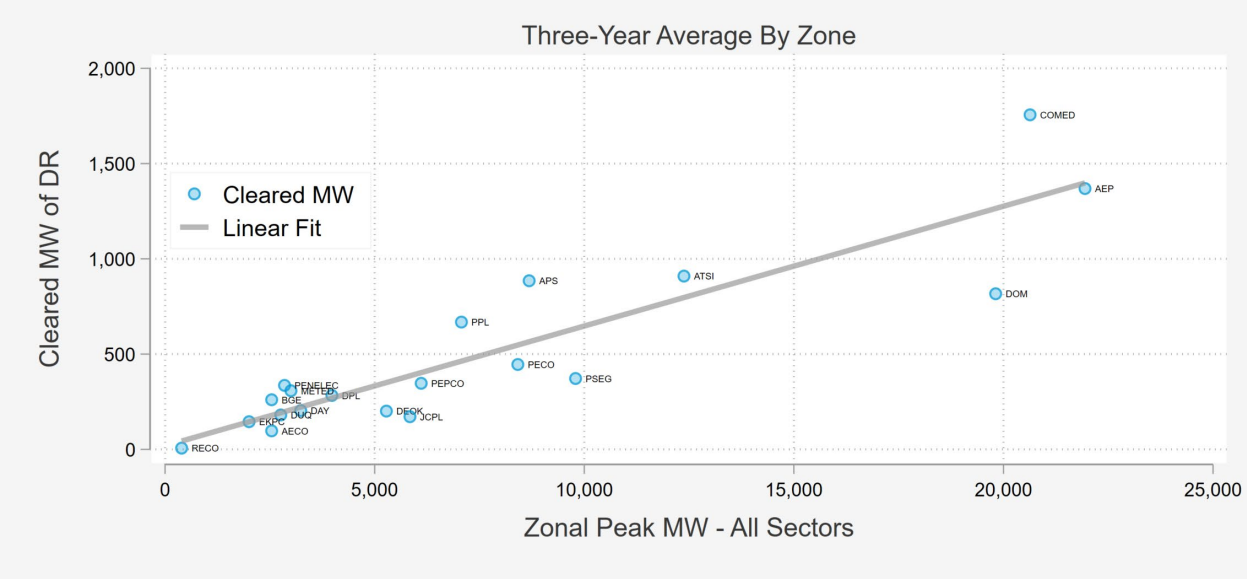
commercial and industrial demand response participants in Pennsylvania. In that report, the numerator of the elasticity calculation (% change in Quantity) reflects both the enrollment rate reductions observed amongst participants relative to their reference loads. The denominator of the elasticity calculation (% change in Price) was based on (1) the average reservation payment in place, (2) the number of event hours per participant, and (3) the average retail rates, by sector, expressed as an "all in" cost per kWh.

TABLE 5-3. PRICE ELASTICITY VALUES

Business Type	Day-Of Elasticity
Medium C&I	0.0006
Large C&I	0.0022

We conducted a separate elasticity calculation, from recent Base Residual Auctions held by PJM, as a robustness check. The PJM market is a useful benchmark because the capacity performance[14] definition largely excludes residential demand response from the market. Figure 5-1 shows the average demand response commitments for the PJM region by zone against the summer peak load.

FIGURE 5-1. THREE-YEAR AVERAGE PJM ZONAL DEMAND RESPONSE COMMITMENTS VERSUS PEAK LOAD



Following each auction, PJM provides a detailed report[15] that includes the level of demand response offered and cleared by zone, along with the zonal clearing price. The GDS team compiled the offered and cleared demand response megawatts by delivery year, along with several factors for each zone:

- Summer peak load forecasts and an estimate of the percentage of peak load attributable to business customers.

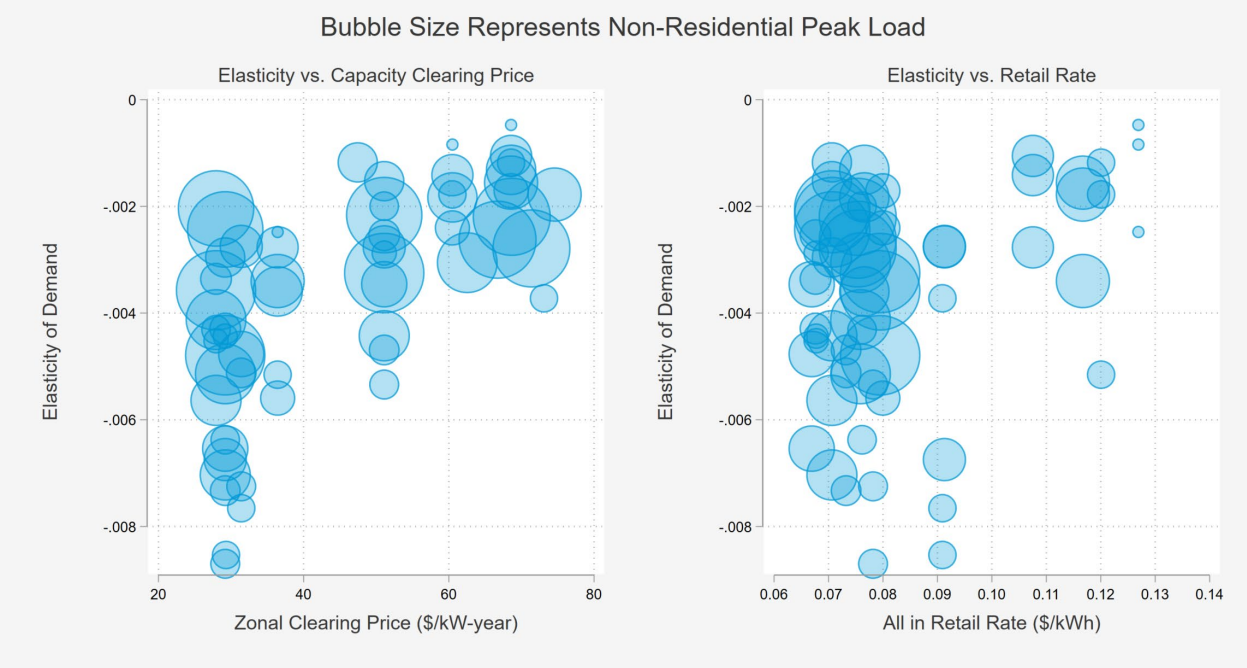
[14] The transition to capacity performance is discussed in detail in *PJM Manual 18*: PJM Interconnection LLC. December 5, 2019. https://pjm.com/~/media/documents/manuals/m18.ashx

[15] The most recent Base Residual Auction report can be found online: PJM Interconnection LLC. n.d. "2021/2022RPM Base Residual Auction Results." PJM #5154776. https://pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2021-2022/2021-2022-base-residual-auction-report.ashx

- Average retail rates for commercial customers and for industrial customers according to EIA Form-861. For states with competitive supply, this includes both energy and delivery to create a bundled all-in cost per kWh.
- Estimates of expected dispatch frequency. This represents the number of hours a participant anticipates being curtailed. We assumed 15 hours per year to balance the historically infrequent dispatch with the extremely broad definition of availability.

Figure 5-2 shows the results. The weighted average price elasticity is approximately 0.003, which is lower than either of the price elasticity values shown in Table 5-3. It is important to keep in mind that NIPSCO's largest and most price responsive customers are on Rate 831 so we expect the remaining non-residential accounts to show lower price elasticity than a zonal total from the PJM footprint, which includes large manufacturing facilities.

FIGURE 5-2. ANALYSIS OF THREE-YEAR AVERAGE PJM AUCTION RESULTS



5.1.1.2 Sample Calculation

Rearranging the terms from the first equation above yields a sample calculation:

$$Percentage\ Change\ in\ Quantity = Elasticity * \ Percentage\ Change\ in\ Price$$

Note that the price elasticity and the sample calculation both have percentage change in quantity equation. These two equations can be combined:

$$Elasticity * \ Percentage\ Change\ in\ Price = \frac{(Summer\ Peak - \ Demand\ Response\ Potential) - Summer\ Peak}{Summer\ Peak}$$

The terms in the above equation can then be rearranged to solve for demand response potential:

$$Demand\ Response\ Potential = \frac{Elasticity * \ Percentage\ Change\ in\ Price * Summer\ Peak}{100\%}$$

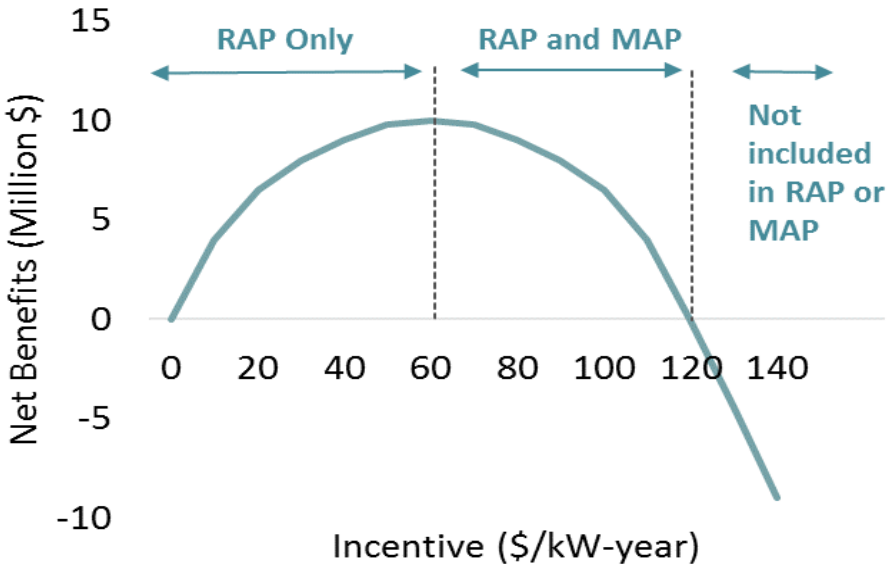
Using the Large C&I primary day-ahead elasticity from Table 5-3 (0.0022), a summer peak load contribution of 439 MW, a retail rate of $0.079 per kilowatt-hour, and an incentive reservation payment of $75 per kW-year spread across 24 event hours, demand response potential would be 38 MW:

$$Demand\ Response\ Potential = \ 0.0022 * \left(\frac{\left(0.079 + \frac{75}{24}\right) - 0.079}{0.079}\right) * 439 = 38\ MW$$

5.1.1.3 Determination of RAP and MAP Incentive Levels

The primary costs of a business load curtailment program are the customer incentive costs and program management costs incurred by NIPSCO. As noted above, we calculated estimates of MAP using the highest incentive possible without net benefits dropping below $0, and calculated estimates of RAP using an incentive level that maximizes the net benefits of the program. Figure 5-3 illustrates the simulation exercise using a simplified example. The highest level of net benefits – the peak of the curve – is associated with an incentive level of $61/kW-year. This incentive level would be used to calculate RAP. The greatest incentive level that maintains positive net benefits – where the curve crosses zero – is $113/kW-year, and is the value that would be used to calculate MAP.

FIGURE 5-3. ILLUSTRATIVE RELATIONSHIP BETWEEN NET BENEFITS AND INCENTIVE LEVEL



The team conducted a simulation for the business sector as a whole and applied the aggregate simulation results to each subgroup. The resulting incentive levels for RAP and MAP from the simulation are shown in Table 5-4.

TABLE 5-4. INCENTIVE PAYMENTS BY YEAR

Year	RAP Incentive ($/kW-year)	MAP Incentive ($/kW-year)
2024	$61	$113
2025	$62	$115
2026	$63	$117
2027	$64	$119
2028	$65	$121
2029	$66	$124
2030	$67	$127
2031	$68	$130
2032	$69	$133
2033	$70	$136
2034	$71	$139
2035	$72	$142
2036	$74	$145
2037	$76	$148
2038	$78	$151
2039	$80	$154
2040	$82	$157
2041	$84	$160
2042	$86	$163
2043	$88	$166

5.1.2 Cost-Effectiveness Results

Table 5-5 summarizes the cost-effectiveness results. Recall that the MAP scenario is designed to set the incentive that maximizes the quantity of demand response while still keeping the UCT ratio above 1. Because the Medium and Large C&I programs are modeled jointly, the MAP UCT ratio for the Medium C&I sector is slightly above 1 while the UCT ratio for the Large C&I sector is slightly below 1, while the joint UCT ratio is equal to 1. The RAP scenario features a lower incentive and therefore a higher UCT ratio, at the expense of less demand response capacity. The quantity of Large C&I demand response is about seven times higher than the Medium C&I quantity for both scenarios. This discrepancy is driven both by a higher price elasticity of the Large C&I sector (meaning that for the same incentive, more capacity is offered) and by the fact that the Large C&I peak load contribution is higher than that of the Medium C&I sector. Figure 5-4 and Figure 5-5 show the RAP and MAP trajectory for both sectors over time. Combined, the total RAP and MAP demand response capacities are 33 and 62 MW in 2043, respectively.

TABLE 5-5: MEDIUM AND LARGE C&I LOAD CURTAILMENT PROGRAM COST-EFFECTIVENESS RESULTS

Result	20-year NPV of Benefits (Thousands 2024$)	20-year NPV of Costs (Thousands 2024$)	UCT Ratio	System Level Capacity in 2043 (MW)	Levelized Cost (2024$/kW-yr)
Medium C&I RAP	$8,002	$4,785	1.67	3.8	$98.94
Medium C&I MAP	$15,244	$13,787	1.11	7.1	$149.65
Large C&I RAP	$51,174	$29,070	1.76	29.2	$77.75
Large C&I MAP	$97,484	$98,663	0.99	55.2	$138.52

Result	20-year NPV of Benefits (Thousands 2024$)	20-year NPV of Costs (Thousands 2024$)	UCT Ratio	System Level Capacity in 2043 (MW)	Levelized Cost (2024$/kW-yr)
Combined RAP	*$59,176*	*$33,855*	*1.75*	*33.0*	-
Combined MAP	*$112,729*	*$112,449*	*1.00*	*62.3*	-

FIGURE 5-4: MEDIUM C&I LOAD CURTAILMENT PROGRAM RAP AND MAP BY YEAR

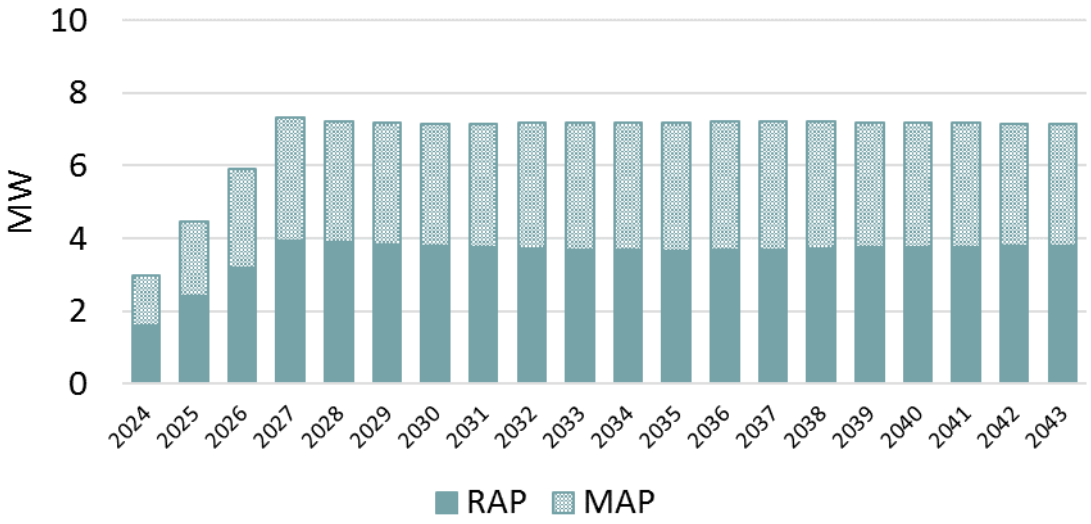
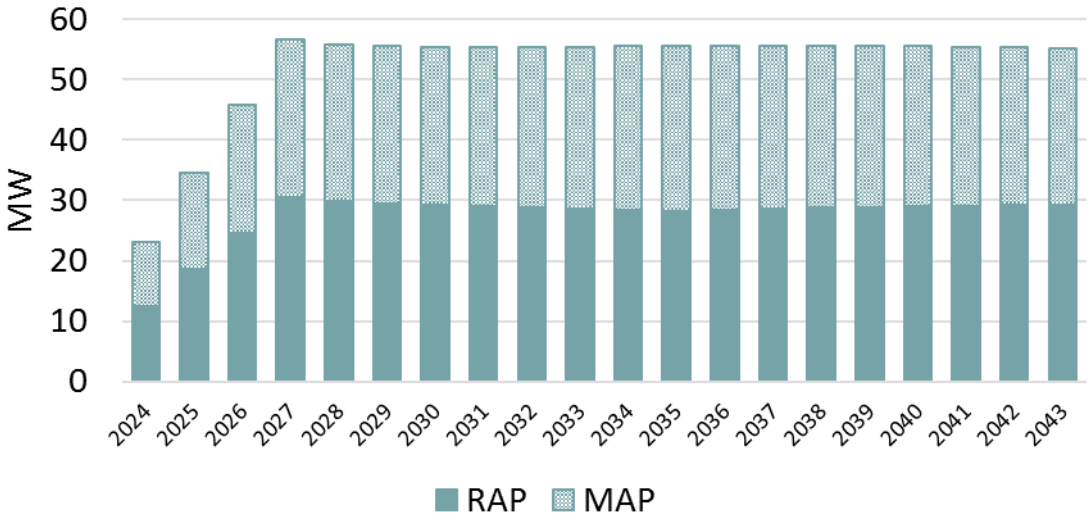


FIGURE 5-5: LARGE C&I LOAD CURTAILMENT PROGRAM RAP AND MAP BY YEAR



5.2 SMALL C&I DYNAMIC RATES (CRITICAL PEAK PRICING)

The Small C&I dynamic rates program is very similar to the Residential Dynamic Rates program offering, except that it would be offered to small non-residential customers, specifically those in the GS Small rate class (Rate 821). Small non-residential customers are traditionally challenging to reach with demand

response programming, because small business owners juggle many responsibilities and energy costs do not typically represent a large component of operating costs or margins. The GDS team assumed several program attributes for modeling purposes:

- The program is available to business customers who opt-in and receive secondary service.
- Participants face a significantly reduced volumetric rate, except on a small number of event days, when the retail rate increases during a critical peak window.
- NIPSCO provides opt-in customers with a free Wi-Fi connected thermostat to help shift their HVAC loads out of critical peak periods (but does not directly manipulate the setpoint).

5.2.1 Program Assumptions

The cost and non-cost assumptions for the Small C&I Dynamic Rates program are shown below. With some key differences, the assumptions are generally similar to those presented for the Residential Dynamic Rates program.

5.2.1.1 Cost Assumptions

Table 5-6 shows the cost assumptions for the Small C&I Dynamic Rates program. All values are the same as the Residential Dynamic Rates program except for the incentive for the RAP scenario. As discussed above, the program incentive is designed as a free smart thermostat at a cost of $150 so that small non-residential customers can better manage their usage during event windows. As with the Residential Dynamic Rates program, the results presented here do not include the full costs of AMI equipment and deployment costs, which can amount to over $1,000 per meter, and the UCT ratios are fairly high relative to other programs considered in this study.

TABLE 5-6. SMALL C&I DYNAMIC RATES COST ASSUMPTIONS

Component	Cost Type	Cost Frequency	RAP	MAP	Notes
Support Labor	Fixed	One time	$250,000	$1,000,000	Billing system startup costs
	Fixed	Recurring	$250,000	$250,000	Billing system operational costs
Signup Incentive	Volumetric	Recurring	$150	$0	RAP incentive covers cost of smart thermostat for participants; MAP incentive is zero because dynamic pricing program is opt-out (default)

5.2.1.2 Other Program Assumptions

Other program assumptions are shown in Table 5-7. There are several notes on particular program assumptions:

- ***Reference loads:*** Reference loads were assumed to be 7.78 kW for small C&I non-residential customers. We obtained this value by multiplying the 2019 peak load by the GS Small (Rate 821) rate class demand cost allocation factor in the 2018 rate case (17.5%) and dividing by the count of small commercial electric accounts from NIPSCO FERC Form 1 (roughly 53,000).
- ***Load reduction:*** As with the Residential Dynamic Rates program, we assumed a 12% whole-premise load reduction for RAP opt-in customer and 3% load reduction for MAP opt-out

scenario, using the same Arcturus model from the Brattle Group. This yields a meter-level impact of 0.96 kW for the RAP scenario and 0.24 kW for the MAP scenario.

- ***Enrollment rate:*** With a $150 free smart thermostat incentive (RAP scenario), we assume an enrollment rate of 10%. The MAP enrollment rate is assumed to be 98%, based on a small number of opt-outs.
- ***Attrition rate:*** A high program attrition rate can have a negative effect on program cost-effectiveness. As with the Residential Dynamic Rates section, we assume a 15% attrition rate per year for the RAP scenario.
- ***Program start year:*** As discussed above, we project that AMI infrastructure is put into place before 2030, when we assume the dynamic rate program takes effect.

TABLE 5-7. SMALL C&I DYNAMIC RATES NON-COST ASSUMPTIONS

Component	RAP	MAP	Units	Notes/Source
Rates start year	2030	2030	Year	Enabling AMI not currently in place
Per-Premise kW reference load	7.78	7.78	kW	Calculated based on residential sector share of 2019 NIPSCO peak load, using 2018 rate case cost allocation factors
Rate price differential (hi/low)	300%	300%	%	
Load Reduction % Impact	12%	3%	%	RAP response based on Brattle Arcturyx formula; MAP opt-out assumed to be 1/4 as high
EUL	20	20	Years	
Enrollment rate	10%	98%	%	
Per-Premise Reduction (at meter)	0.96	0.24	kW	Load reduction per device at meter = Reference load * % Impact
Event opt-out rate	10%	10%	% of customers	
Year-over-year attrition rate	15%	0%	% of customers	Value based on Consumers Energy dynamic rates attrition rate
Per-Premise Reduction (at system, i.e. w/ losses and opt-outs)	0.90	0.22	kW	Load reduction per device for program = Reference load * % Impact * (1-opt-out rate) / (1-losses)

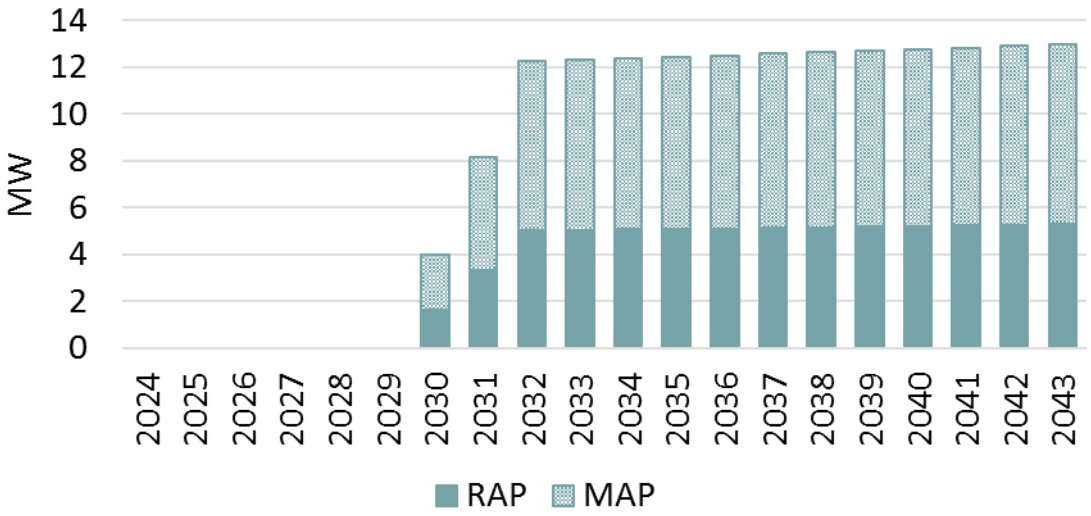
5.2.2 Cost-Effectiveness Results

Table 5-8 summarizes the cost-effectiveness results, while Figure 5-6 shows the program capacity over time for the RAP and MAP scenarios. As was the case for the Residential Dynamic Rates program, the cost-effectiveness results for the Residential Dynamic Rates should be interpreted with two key considerations in mind: first, enabling AMI infrastructure is not currently in place, rendering these programs infeasible in the near term, and so the assumed start date for this program is in 2030; second, these values exclude the majority of costs that would be incurred to deploy AMI in the NIPSCO territory. The UCT ratios for both the RAP and MAP scenarios are quite high, in part due to the exclusion of most AMI costs. In addition, the MAP scenario capacity is more than twice as large as the RAP scenario, as the opt-out program design ,enrolling nearly ten times as many participants as the RAP opt-in scenario, is offset by lower per-participant impacts. The total RAP and MAP demand response capacities are 5 and 13 MW in 2043, respectively. Despite having larger per-premise impacts than the Residential Dynamic Rates program, the Small C&I program has roughly half the capacity because the eligible customer population has a smaller peak load contribution than the residential sector.

TABLE 5-8: SMALL C&I DYNAMIC RATES PROGRAM COST-EFFECTIVENESS RESULTS

Parameter	RAP	MAP
20-year NPV of Benefits (Thousand 2024$)	$6,540	$16,022
20-year NPV of Costs (Thousand 2024$)	$3,669	$2,710
UCT Ratio	1.78	5.91
Devices in 2043	5,893	57,752
System Level Capacity in 2043 (MW)	5.3	13.0
Levelized Cost (2024$/kW-yr)	$92.92	$28.01

FIGURE 5-6: SMALL C&I DYNAMIC RATES PROGRAM RAP AND MAP BY YEAR



6 Alternate Avoided Cost Case Sensitivity

For Demand Response, due to the importance of the avoided generation cost assumption on overall cost-effectiveness, the GDS team produced a sensitivity case in which the avoided cost of generation capacity was reduced from $129/kW-yr to $80/kW-yr in 2024 nominal dollars. This alternate case is meant to reflect the cost of a natural gas combustion turbine as the proxy unit, instead of a combined cycle unit, as in the base case. The total avoided cost of capacity in this case is $115/kW-yr, compared to $164/kW-yr in the base case.

This change had one of two effects, depending on the program in question. For three programs – Residential Rates, Small C&I Rates, and Residential Water Heaters – the new set of avoided costs did not change whether any program was cost-effective or not, for either the RAP or MAP scenario. The UCT ratios in the alternate case were lower for these programs, but program structures and costs otherwise remained unchanged. For the remaining programs – Residential Smart Thermostats, Medium and Large C&I Load Curtailment – the incentive levels, and therefore the enrollment rates, were reduced to ensure that programs remained cost-effective. The result is a reduction in total demand response potential in the alternate case but also in the program costs per kW of capacity. Table 6-1 provides a comparison of the 2043 demand response potential for the alternate case against the base case. The alternate case RAP potential is 41 MW, compared to 57 MW in the base case, and the alternate case MAP potential is 100 MW, compared to 136 MW in the base case. This corresponds to a 26% and 28% reduction in potential for the RAP and MAP scenarios, respectively.

TABLE 6-1: COMPARISON OF BASE AND ALTERNATE CASE 2043 DR POTENTIAL QUANTITIES

Sector	Program	Alternate Scenario Changes	RAP Alternate	RAP Base	MAP Alternate	MAP Base
Residential	Residential Smart Thermostat	Lower incentives & enrollments[16]	4	8	25	37
	Water Heater Direct Load Control*	None	11	11	24	24
	Residential Dynamic Rates (Critical Peak Pricing)	None	0	0	0	0
Non-Residential	Small C&I Dynamic Rates (Critical Peak Pricing)	None	5	5	13	13
	Medium C&I Load Curtailment	Lower incentives & enrollments[17]	2	4	4	7
	Large C&I Load Curtailment	Lower incentives & enrollments	19	29	34	55
Total			**41**	**57**	**100**	**136**

[16] For Residential Smart Thermostats, in the MAP scenario, the annual recurring incentive was reduced to $50 from $75 and enrollment rates were reduced from 30% to 20% for new enrollments and 15% to 10% for customers with existing smart thermostats. This is identical to the RAP scenario in the base case. For the alternate case RAP scenario, the annual incentive was reduced from $50 to $25 and enrollment rates were reduced from 20% to 10% for new enrollments and 10% to 5% for customers with existing smart thermostats. These enrollment rates are tied to the MAP and RAP smart thermostat deployments from energy efficiency programs, which were assumed to remain unchanged given the very minor difference in energy efficiency potential between the base case and the alternate avoided cost scenario.

[17] For both Medium and Large C&I customers (modeled jointly), the starting 2024 incentive level was reduced from $113/kW-year to $68/kW-yr in the MAP scenario and from $61/kW-yr to $37/kW-yr in the RAP scenario.

Table 6-2 shows the cumulative annual MAP savings in MW for 2024, 2025, 2026, 2033, and 2043. As with the base case, the only program that did not pass the cost-effectiveness screening was the Residential Water Heater direct load control program. Table 6-3 provides the same information for the RAP scenario. As was true in the base case, the Large C&I Load Curtailment program provides the highest amount of demand response capacity in both the near term and over the long term for both the RAP and the MAP scenarios. The total MAP capacity in 2043 is 100 MW and the total RAP capacity is 41 MW.

TABLE 6-2 MAP ALTERNATE CASE SAVINGS BY PROGRAM

Sector	Program	2024 (MW)	2025 (MW)	2026 (MW)	2033 (MW)	2043 (MW)
Residential	Residential Smart Thermostat	5	5	6	13	25
	Water Heater Direct Load Control*	0	0	0	0	0
	Residential Dynamic Rates (Critical Peak Pricing)	0	0	0	24	24
	Subtotal	5	5	6	37	49
Non-Residential	Small C&I Dynamic Rates (Critical Peak Pricing)	0	0	0	12	13
	Medium C&I Load Curtailment	2	3	4	4	4
	Large C&I Load Curtailment	14	21	27	33	34
	Subtotal	16	23	31	50	51
Residential & Non-Residential Total		**21**	**29**	**37**	**87**	**100**

TABLE 6-3 ALTERNATE CASE RAP SAVINGS BY PROGRAM

Sector	Program	2024 (MW)	2025 (MW)	2026 (MW)	2033 (MW)	2043 (MW)
Residential	Residential Smart Thermostat	2	2	2	3	4
	Water Heater Direct Load Control*	0	0	0	0	0
	Residential Dynamic Rates (Critical Peak Pricing)	0	0	0	10	11
	Subtotal	2	2	2	13	15
Non-Residential	Small C&I Dynamic Rates (Critical Peak Pricing)	0	0	0	5	5
	Medium C&I Load Curtailment	1	1	2	2	2
	Large C&I Load Curtailment	8	11	15	19	19
	Subtotal	9	13	17	26	26
Residential & Non-Residential Total		**11**	**15**	**19**	**39**	**41**

Table 6-4 and Table 6-5 show the MAP and RAP budget requirement for selected years to achieve the estimated potential by sector and scenario. As was true of the base case, all costs associated with these programs are included in the budgets, with the exception of AMI meters and associated IT infrastructure required to implement dynamic rates for the residential and small C&I customer sectors.

TABLE 6-4 ALTERNATE CASE SUMMARY OF MAP BUDGET REQUIREMENTS (NOMINAL)

Year	Residential	Non-Residential	Total
2024	$514,520	$1,705,230	$2,219,750
2025	$520,084	$2,372,186	$2,892,270
2026	$590,176	$3,039,056	$3,629,232
2033	$1,886,228	$4,393,030	$6,279,258
2043	$3,752,267	$5,371,351	$9,123,618

TABLE 6-5 ALTERNATE CASE SUMMARY OF RAP BUDGET REQUIREMENTS (NOMINAL)

Year	Residential	Non-Residential	Total
2024	$192,046	$804,546	$996,592
2025	$160,351	$1,022,316	$1,182,667
2026	$164,463	$1,249,390	$1,413,853
2033	$764,906	$1,927,068	$2,691,974
2043	$1,046,128	$2,301,473	$3,347,601

Table 6-6 and Table 6-7 show the net present benefits and costs for each program in the alternate case for the MAP and RAP scenarios, respectively.

TABLE 6-6 ALTERNATE CASE MAP NPV BENEFITS, COSTS, AND UCT RATIOS FOR EACH DEMAND RESPONSE PROGRAM (THOUSAND 2024$)

Sector	Program	NPV Benefits	NPV Costs	UCT Ratio
Residential	Residential Smart Thermostat	$19,662	$16,009	1.23
	Water Heater Direct Load Control*	$3,733	$8,059	0.46
	Residential Dynamic Rates (Critical Peak Pricing)	$21,524	$2,710	7.94
Non-Residential	Small C&I Dynamic Rates (Critical Peak Pricing)	$11,166	$2,710	4.12
	Medium C&I Load Curtailment	$6,450	$5,884	1.10
	Large C&I Load Curtailment	$37,576	$37,565	1.00
Total		**$96,379**	**$64,877**	**1.49**

TABLE 6-7 ALTERNATE CASE RAP NPV BENEFITS, COSTS, AND UCT RATIOS FOR EACH DEMAND RESPONSE PROGRAM (THOUSAND 2024$)

Sector	Program	NPV Benefits	NPV Costs	UCT Ratio
Residential	Residential Smart Thermostat	$4,303	$2,734	1.57
	Water Heater Direct Load Control*	$3,733	$8,059	0.46
	Residential Dynamic Rates (Critical Peak Pricing)	$9,129	$4,162	2.19
Non-Residential	Small C&I Dynamic Rates (Critical Peak Pricing)	$4,558	$3,669	1.24
	Medium C&I Load Curtailment	$3,603	$2,771	1.30
	Large C&I Load Curtailment	$20,988	$13,497	1.55
Total		**$42,579**	**$26,833**	**1.59**

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VOLUME III DEMAND RESPONSE POTENTIAL

2021

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Appendix A Residential Electric Energy Efficiency Measure Data

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
1001	Appliance	ENERGY STAR Air Purifier	SF	N/A	MO	67%	488	0.084	9	$70.00	51%	82.9%	37.0%	9.2	1,539	13,853	573	11,486	431	5,130
1002	Appliance	ENERGY STAR Refrigerator	SF	NLI	MO	9%	56	0.009	17	$140.00	89%	82.9%	53.3%	0.5	154	2,625	0	0	0	0
1003	Appliance	CEE Tier 2 Refrigerator	SF	NLI	MO	25%	149	0.023	17	$140.00	51%	82.9%	44.4%	2.3	822	13,967	0	0	0	0
1004	Appliance	Smart Refrigerator	SF	NLI	MO	12%	74	0.011	17	$680.00	51%	82.9%	44.4%	0.2	408	6,936	0	0	0	0
1005	Appliance	ENERGY STAR Refrigerator	SF	LI	ER1	75%	757	0.108	9	$760.00	100%	82.9%	58.5%	0.6	2,330	20,967	315	17,365	214	4,687
1006	Appliance	ENERGY STAR Refrigerator	SF	LI	ER2	9%	56	0.009	8	$0.00	35%	82.9%	44.4%	#DIV/0!	0	1,379	0	881	0	214
1007	Appliance	ENERGY STAR Refrigerator	SF	LI	ER3	9%	56	0.009	17	$140.00	89%	82.9%	53.3%	0.5	0	517	0	105	0	39
1008	Appliance	Refrigerator Coil Cleaning	SF	N/A	Retrofit	2%	20	0.000	1	$4.50	100%	82.9%	58.5%	0.2	4,848	4,848	0	0	0	0
1009	Appliance	Refrigerator Recycling	SF	N/A	Recycle	100%	1,009	0.150	8	$50.00	100%	82.9%	58.5%	11.6	4,597	36,772	2,601	30,490	2,453	21,522
1010	Appliance	ENERGY STAR Clothes Washer (Electrc WH/Dryer)	SF	N/A	MO	22%	112	0.430	14	$84.00	51%	82.9%	67.1%	2.4	21	295	15	245	14	198
1011	Appliance	Smart/CEE Tier3 Clothes Washer (Electrc WH/Dryer)	SF	N/A	MO	40%	209	0.801	14	$141.00	51%	82.9%	67.1%	2.7	39	550	28	456	26	369
1012	Appliance	ENERGY STAR Dishwasher (E WH)	SF	N/A	MO	12%	37	0.105	11	$75.67	51%	82.9%	77.6%	0.6	36	393	0	0	0	0
1013	Appliance	Smart Dishwasher (E WH)	SF	N/A	MO	15%	45	0.129	11	$395.00	51%	82.9%	77.6%	0.1	44	483	0	0	0	0
1014	Appliance	ENERGY STAR Dehumidifier	SF	N/A	MO	11%	92	0.056	12	$10.29	51%	82.9%	50.0%	16.8	362	4,342	369	6,480	326	3,907
1015	Appliance	ENERGY STAR Most Efficient Dehumidifier	SF	N/A	MO	27%	226	0.138	12	$75.00	51%	82.9%	50.0%	5.7	889	10,665	101	1,769	89	1,067
1016	Appliance	ENERGY STAR Freezer	SF	N/A	MO	10%	36	0.006	22	$35.00	51%	82.9%	56.3%	2.7	220	4,396	124	3,488	124	2,475
1017	Appliance	Freezer Recycling	SF	N/A	Recycle	100%	704	0.100	8	$50.00	100%	86.4%	86.4%	8.0	391	3,129	338	2,703	338	2,703
1018	Appliance	ENERGY STAR Clothes Dryer (Electric)	SF	N/A	MO	21%	160	0.567	16	$152.00	51%	82.9%	37.0%	2.1	197	2,977	35	4,492	32	2,011
1019	Appliance	Smart Clothes Dryer (Electric)	SF	N/A	MO	26%	203	0.716	16	$986.00	8%	82.9%	17.9%	2.6	498	7,524	0	0	0	0
1020	Appliance	Heat Pump Dryer	SF	N/A	MO	70%	539	1.905	16	$900.00	9%	82.9%	18.2%	6.9	1,325	20,003	178	22,635	157	5,413
1021	Appliance	Dryer Vent Cleaning (Electric)	SF	N/A	Retrofit	6%	42	0.149	1	$80.00	86%	82.9%	51.9%	0.0	2,608	2,461	0	0	0	0
1022	Appliance	ENERGY STAR Water Cooler	SF	N/A	MO	46%	49	0.006	10	$17.00	51%	82.9%	63.6%	3.6	162	1,615	104	1,339	103	1,027
1023	Appliance	ENERGY STAR Air Purifier	SF	N/A	NC	67%	488	0.084	9	$70.00	51%	82.9%	37.0%	9.2	85	1,663	17	1,379	14	616
1024	Appliance	ENERGY STAR Refrigerator	SF	N/A	NC	9%	56	0.009	17	$140.00	89%	82.9%	53.3%	0.5	24	467	0	0	0	0
1025	Appliance	CEE Tier 2 Refrigerator	SF	N/A	NC	25%	149	0.023	17	$140.00	51%	82.9%	37.0%	2.3	127	2,485	0	0	0	0
1026	Appliance	Smart Refrigerator	SF	N/A	NC	12%	74	0.011	17	$680.00	51%	82.9%	37.0%	0.2	63	1,234	0	0	0	0
1027	Appliance	ENERGY STAR Clothes Washer (Electrc WH/Dryer)	SF	N/A	NC	22%	112	0.430	14	$84.00	51%	82.9%	37.0%	2.4	2	46	0	38	0	17
1028	Appliance	Smart/CEE Tier3 Clothes Washer (Electrc WH/Dryer)	SF	N/A	NC	40%	209	0.801	14	$141.00	51%	82.9%	37.0%	2.7	4	85	1	70	1	31
1029	Appliance	ENERGY STAR Dishwasher (E WH)	SF	N/A	NC	12%	37	0.105	11	$75.67	51%	82.9%	37.0%	0.6	3	66	0	0	0	0
1030	Appliance	Smart Dishwasher (E WH)	SF	N/A	NC	15%	45	0.129	11	$395.00	51%	82.9%	37.0%	0.1	4	81	0	0	0	0
1031	Appliance	ENERGY STAR Dehumidifier	SF	N/A	NC	11%	92	0.056	12	$10.29	51%	82.9%	37.0%	16.8	30	598	11	888	9	396
1032	Appliance	ENERGY STAR Most Efficient Dehumidifier	SF	N/A	NC	27%	226	0.138	12	$75.00	51%	82.9%	37.0%	5.7	75	1,468	3	242	2	108
1033	Appliance	ENERGY STAR Freezer	SF	N/A	NC	10%	36	0.006	22	$35.00	51%	82.9%	37.0%	2.7	35	695	7	490	6	228
1034	Appliance	ENERGY STAR Clothes Dryer (Electric)	SF	N/A	NC	21%	160	0.567	16	$152.00	51%	82.9%	37.0%	2.1	17	319	7	525	6	238
1035	Appliance	Smart Clothes Dryer (Electric)	SF	N/A	NC	26%	203	0.716	16	$986.00	8%	82.9%	17.9%	2.6	44	807	0	0	0	0
1036	Appliance	Heat Pump Dryer	SF	N/A	NC	70%	539	1.905	16	$900.00	9%	82.9%	18.2%	6.9	116	2,145	34	2,647	28	608
1037	Appliance	ENERGY STAR Water Cooler	SF	N/A	NC	46%	49	0.006	10	$17.00	51%	82.9%	37.0%	3.6	12	245	2	203	2	90
1038	Appliance	ENERGY STAR Air Purifier	MF	N/A	MO	67%	488	0.084	9	$70.00	51%	82.9%	37.0%	9.2	39	347	14	288	11	129
1039	Appliance	ENERGY STAR Refrigerator	MF	NLI	MO	9%	56	0.009	17	$140.00	89%	82.9%	53.3%	0.5	3	46	0	0	0	0
1040	Appliance	Smart Refrigerator	MF	NLI	MO	12%	74	0.011	17	$680.00	51%	82.9%	50.1%	0.2	7	122	0	0	0	0
1041	Appliance	CEE Tier 2 Refrigerator	MF	NLI	MO	25%	149	0.023	17	$140.00	51%	82.9%	50.1%	2.3	14	246	0	0	0	0
1042	Appliance	ENERGY STAR Refrigerator	MF	LI	ER1	75%	757	0.108	9	$760.00	100%	82.9%	58.5%	0.6	137	1,236	19	1,024	13	276
1043	Appliance	ENERGY STAR Refrigerator	MF	LI	ER2	9%	56	0.009	8	$0.00	35%	82.9%	50.1%	#DIV/0!	0	81	0	52	0	13
1044	Appliance	ENERGY STAR Refrigerator	MF	LI	ER3	9%	56	0.009	17	$140.00	89%	82.9%	53.3%	0.5	0	31	0	6	0	2
1045	Appliance	Refrigerator Coil Cleaning	MF	N/A	Retrofit	2%	20	0.000	1	$4.50	100%	82.9%	58.5%	0.2	133	133	0	0	0	0
1046	Appliance	Refrigerator Recycling	MF	N/A	Recycle	100%	1,009	0.150	8	$50.00	100%	82.9%	58.5%	11.6	25	204	14	169	14	119
1047	Appliance	ENERGY STAR Clothes Washer (Electrc WH/Dryer)	MF	N/A	MO	22%	112	0.430	14	$84.00	51%	82.9%	67.1%	2.4	2	33	2	28	2	22
1048	Appliance	Smart/CEE Tier3 Clothes Washer (Electrc WH/Dryer)	MF	N/A	MO	40%	209	0.801	14	$141.00	51%	82.9%	67.1%	2.7	4	62	3	52	3	42
1049	Appliance	ENERGY STAR Dishwasher (E WH)	MF	N/A	MO	12%	37	0.105	11	$75.67	51%	82.9%	77.6%	0.6	3	28	0	0	0	0
1050	Appliance	Smart Dishwasher (E WH)	MF	N/A	MO	15%	45	0.129	11	$395.00	51%	82.9%	77.6%	0.1	3	34	0	0	0	0
1051	Appliance	ENERGY STAR Dehumidifier	MF	N/A	MO	11%	92	0.056	12	$10.29	51%	82.9%	50.0%	16.8	3	36	3	54	3	32
1052	Appliance	ENERGY STAR Most Efficient Dehumidifier	MF	N/A	MO	27%	226	0.138	12	$75.00	51%	82.9%	50.0%	5.7	7	88	1	15	1	9
1053	Appliance	ENERGY STAR Freezer	MF	N/A	MO	10%	36	0.006	22	$35.00	51%	82.9%	56.3%	2.7	3	63	2	50	2	35
1054	Appliance	Freezer Recycling	MF	N/A	Recycle	100%	704	0.100	8	$50.00	100%	86.4%	86.4%	8.0	0	0	0	0	0	0
1055	Appliance	ENERGY STAR Clothes Dryer (Electric)	MF	N/A	MO	21%	160	0.567	16	$152.00	51%	82.9%	37.0%	2.1	10	154	2	233	2	104
1056	Appliance	Smart Clothes Dryer (Electric)	MF	N/A	MO	26%	203	0.716	16	$986.00	8%	82.9%	17.9%	2.6	26	390	0	0	0	0
1057	Appliance	Heat Pump Dryer	MF	N/A	MO	70%	539	1.905	16	$900.00	9%	82.9%	18.2%	6.9	69	1,037	9	1,174	8	281
1058	Appliance	Dryer Vent Cleaning (Electric)	MF	N/A	Retrofit	6%	42	0.149	1	$80.00	100%	82.9%	58.5%	0.0	135	128	0	0	0	0
1059	Appliance	ENERGY STAR Water Cooler	MF	N/A	MO	46%	49	0.006	10	$17.00	51%	82.9%	63.6%	3.6	5	50	3	42	3	32
1060	Appliance	ENERGY STAR Air Purifier	MF	N/A	NC	67%	488	0.084	9	$70.00	51%	82.9%	37.0%	9.2	2	42	0	35	0	15
1061	Appliance	ENERGY STAR Refrigerator	MF	N/A	NC	9%	56	0.009	17	$140.00	89%	82.9%	53.3%	0.5	1	14	0	0	0	0
1062	Appliance	CEE Tier 2 Refrigerator	MF	N/A	NC	25%	149	0.023	17	$140.00	51%	82.9%	37.0%	2.3	4	75	0	0	0	0
1063	Appliance	Smart Refrigerator	MF	N/A	NC	12%	74	0.011	17	$680.00	51%	82.9%	37.0%	0.2	2	37	0	0	0	0
1064	Appliance	ENERGY STAR Clothes Washer (Electrc WH/Dryer)	MF	N/A	NC	22%	112	0.430	14	$84.00	51%	82.9%	37.0%	2.4	0	5	0	4	0	2
1065	Appliance	Smart/CEE Tier3 Clothes Washer (Electrc WH/Dryer)	MF	N/A	NC	40%	209	0.801	14	$141.00	51%	82.9%	37.0%	2.7	0	10	0	8	0	4
1066	Appliance	ENERGY STAR Dishwasher (E WH)	MF	N/A	NC	12%	37	0.105	11	$75.67	51%	82.9%	37.0%	0.6	0	5	0	0	0	0
1067	Appliance	Smart Dishwasher (E WH)	MF	N/A	NC	15%	45	0.129	11	$395.00	51%	82.9%	37.0%	0.1	0	6	0	0	0	0
1068	Appliance	ENERGY STAR Dehumidifier	MF	N/A	NC	11%	92	0.056	12	$10.29	51%	82.9%	37.0%	16.8	0	5	0	7	0	3
1069	Appliance	ENERGY STAR Most Efficient Dehumidifier	MF	N/A	NC	27%	226	0.138	12	$75.00	51%	82.9%	37.0%	5.7	1	12	0	2	0	1
1070	Appliance	ENERGY STAR Freezer	MF	N/A	NC	10%	36	0.006	22	$35.00	51%	82.9%	37.0%	2.7	1	10	0	7	0	3
1071	Appliance	ENERGY STAR Clothes Dryer (Electric)	MF	N/A	NC	21%	160	0.567	16	$152.00	51%	82.9%	37.0%	2.1	1	17	0	27	0	12

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
1072	Appliance	Smart Clothes Dryer (Electric)	MF	N/A	NC	26%	203	0.716	16	$986.00	8%	82.9%	17.9%	2.6	2	42	0	0	0	0
1073	Appliance	Heat Pump Dryer	MF	N/A	NC	70%	539	1.905	16	$900.00	9%	82.9%	18.2%	6.9	6	111	2	137	1	32
1074	Appliance	ENERGY STAR Water Cooler	MF	N/A	NC	46%	49	0.006	10	$17.00	51%	82.9%	37.0%	3.6	0	8	0	6	0	3
1075	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	MO	12%	16	0.046	11	$75.67	36%	82.9%	77.6%	0.5	11	126	0	0	0	0
1076	Appliance	Smart Dishwasher (NG WH)	SF	N/A	MO	15%	20	0.057	11	$395.00	36%	82.9%	77.6%	0.1	14	154	0	0	0	0
1077	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	27%	102	0.390	14	$84.00	51%	82.9%	67.1%	2.2	14	194	10	161	9	130
1078	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	26%	101	0.386	14	$141.00	51%	82.9%	67.1%	1.5	14	192	10	160	9	129
1079	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	NC	12%	16	0.046	11	$75.67	36%	82.9%	30.1%	0.5	1	21	0	0	0	0
1080	Appliance	Smart Dishwasher (NG WH)	SF	N/A	NC	15%	20	0.057	11	$395.00	36%	82.9%	30.1%	0.1	1	26	0	0	0	0
1081	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	27%	102	0.390	14	$84.00	51%	82.9%	37.0%	2.2	2	30	0	25	0	11
1082	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	26%	101	0.386	14	$141.00	51%	82.9%	37.0%	1.5	2	30	0	24	0	11
1083	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	MO	12%	16	0.046	11	$75.67	36%	82.9%	77.6%	0.5	0	3	0	0	0	0
1084	Appliance	Smart Dishwasher (NG WH)	MF	N/A	MO	15%	20	0.057	11	$395.00	36%	82.9%	77.6%	0.1	0	3	0	0	0	0
1085	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	27%	102	0.390	14	$84.00	51%	82.9%	67.1%	2.2	0	7	0	5	0	4
1086	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	26%	101	0.386	14	$141.00	51%	82.9%	67.1%	1.5	0	6	0	5	0	4
1087	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	NC	12%	16	0.046	11	$75.67	36%	82.9%	30.1%	0.5	0	0	0	0	0	0
1088	Appliance	Smart Dishwasher (NG WH)	MF	N/A	NC	15%	20	0.057	11	$395.00	36%	82.9%	30.1%	0.1	0	1	0	0	0	0
1089	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	27%	102	0.390	14	$84.00	51%	82.9%	37.0%	2.2	0	1	0	1	0	0
1090	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	26%	101	0.386	14	$141.00	51%	82.9%	37.0%	1.5	0	1	0	1	0	0
1091	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	MO	12%	16	0.046	11	$75.67	36%	82.9%	77.6%	0.5	90	995	0	0	0	0
1092	Appliance	Smart Dishwasher (NG WH)	SF	N/A	MO	15%	20	0.057	11	$395.00	36%	82.9%	77.6%	0.1	111	1,224	0	0	0	0
1093	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	27%	102	0.390	14	$84.00	51%	82.9%	67.1%	2.2	110	1,540	78	1,277	74	1,033
1094	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	26%	101	0.386	14	$141.00	51%	82.9%	67.1%	1.5	109	1,525	77	1,264	73	1,023
1095	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	44%	19	0.071	14	$84.00	36%	82.9%	67.1%	0.9	42	588	0	0	0	0
1096	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	-3%	-1	-0.005	14	$141.00	36%	82.9%	67.1%	0.5	-3	-38	0	0	0	0
1097	Appliance	Dryer Vent Cleaning (NG)	SF	N/A	Retrofit	6%	7	0.024	1	$80.00	86%	82.9%	51.9%	0.0	741	700	0	0	0	0
1098	Appliance	ENERGY STAR Clothes Dryer (NG)	SF	N/A	MO	21%	26	0.091	16	$152.00	36%	82.9%	30.1%	0.7	141	2,137	0	0	0	0
1099	Appliance	Smart Clothes Dryer (NG)	SF	N/A	MO	26%	32	0.115	16	$986.00	6%	82.9%	17.1%	0.9	179	2,700	0	0	0	0
1100	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	NC	12%	16	0.046	11	$75.67	36%	82.9%	30.1%	0.5	17	372	0	0	0	0
1101	Appliance	Smart Dishwasher (NG WH)	SF	N/A	NC	15%	20	0.057	11	$395.00	36%	82.9%	30.1%	0.1	21	457	0	0	0	0
1102	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	27%	102	0.390	14	$84.00	51%	82.9%	37.0%	2.2	25	530	5	432	4	193
1103	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	26%	101	0.386	14	$141.00	51%	82.9%	37.0%	1.5	24	525	5	428	4	191
1104	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	44%	19	0.071	14	$84.00	36%	82.9%	30.1%	0.9	9	202	0	0	0	0
1105	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	-3%	-1	-0.005	14	$141.00	36%	82.9%	30.1%	0.5	-1	-13	0	0	0	0
1106	Appliance	ENERGY STAR Clothes Dryer (NG)	SF	N/A	NC	21%	26	0.091	16	$152.00	36%	82.9%	30.1%	0.7	25	503	0	0	0	0
1107	Appliance	Smart Clothes Dryer (NG)	SF	N/A	NC	26%	32	0.115	16	$986.00	6%	82.9%	17.1%	0.9	31	635	0	0	0	0
1108	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	MO	12%	16	0.046	11	$75.67	36%	82.9%	77.6%	0.5	3	34	0	0	0	0
1109	Appliance	Smart Dishwasher (NG WH)	MF	N/A	MO	15%	20	0.057	11	$395.00	36%	82.9%	77.6%	0.1	4	41	0	0	0	0
1110	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	27%	102	0.390	14	$84.00	51%	82.9%	67.1%	2.2	6	83	4	68	4	55
1111	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	26%	101	0.386	14	$141.00	51%	82.9%	67.1%	1.5	6	82	4	68	4	55
1112	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	44%	19	0.071	14	$84.00	36%	82.9%	67.1%	0.9	1	10	0	0	0	0
1113	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	-3%	-1	-0.005	14	$141.00	36%	82.9%	67.1%	0.5	0	-1	0	0	0	0
1114	Appliance	Dryer Vent Cleaning (NG)	MF	N/A	Retrofit	6%	7	0.024	1	$80.00	100%	82.9%	58.5%	0.0	17	16	0	0	0	0
1115	Appliance	ENERGY STAR Clothes Dryer (NG)	MF	N/A	MO	21%	26	0.091	16	$152.00	36%	82.9%	30.1%	0.7	3	49	0	0	0	0
1116	Appliance	Smart Clothes Dryer (NG)	MF	N/A	MO	26%	32	0.115	16	$986.00	6%	82.9%	17.1%	0.9	4	62	0	0	0	0
1117	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	NC	12%	16	0.046	11	$75.67	36%	82.9%	30.1%	0.5	1	27	0	0	0	0
1118	Appliance	Smart Dishwasher (NG WH)	MF	N/A	NC	15%	20	0.057	11	$395.00	36%	82.9%	30.1%	0.1	2	33	0	0	0	0
1119	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	27%	102	0.390	14	$84.00	51%	82.9%	37.0%	2.2	3	61	1	50	0	22
1120	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	26%	101	0.386	14	$141.00	51%	82.9%	37.0%	1.5	3	61	1	49	0	22
1121	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	44%	19	0.071	14	$84.00	36%	82.9%	30.1%	0.9	0	7	0	0	0	0
1122	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	-3%	-1	-0.005	14	$141.00	36%	82.9%	30.1%	0.5	0	0	0	0	0	0
1123	Appliance	ENERGY STAR Clothes Dryer (NG)	MF	N/A	NC	21%	26	0.091	16	$152.00	36%	82.9%	30.1%	0.7	1	25	0	0	0	0
1124	Appliance	Smart Clothes Dryer (NG)	MF	N/A	NC	26%	32	0.115	16	$986.00	6%	82.9%	17.1%	0.9	2	31	0	0	0	0
2001	Audit	Audit Recommendations (elec) - Single-family	SF	NLI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	36	724	3	30	4	21
2002	Audit	Audit Recommendations (elec) - Single-family	SF	LI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	12	246	2	10	1	3
2003	Audit	Audit Recommendations (elec) - Multifamily	MF	NLI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	1	14	0	1	0	0
2004	Audit	Audit Recommendations (elec) - Multifamily	MF	NLI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	0	0	0	1	0	0
2005	Audit	Audit Recommendations (elec) - Multifamily	MF	LI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	1	16	0	1	0	0
2006	Audit	Audit Recommendations (elec/gas) - Single-family	SF	NLI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	273	5,440	16	223	20	157
2007	Audit	Audit Recommendations (elec/gas) - Single-family	SF	LI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	96	1,911	19	78	14	26
2008	Audit	Audit Recommendations (elec/gas) - Multifamily	MF	NLI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	7	146	0	6	1	4
2009	Audit	Audit Recommendations (elec/gas) - Multifamily	MF	NLI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	0	0	1	6	1	4
2010	Audit	Audit Recommendations (elec/gas) - Multifamily	MF	LI	DI	0%	22	0.012	1	$55.00	100%	82.0%	57.8%	0.1	9	181	2	7	1	2
3001	Behavioral	Home Energy Reports	SF	N/A	Retrofit	2%	143	0.016	1	$0.00	100%	100.0%	100.0%	#########	5,248	5,248	2,422	5,248	2,719	5,248
3002	Behavioral	Home Energy Management System	SF	N/A	Retrofit	3%	263	0.030	5	$90.00	61%	100.0%	100.0%	1.6	0	0	0	0	0	0
3003	Behavioral	Pre-pay	SF	N/A	Retrofit	5%	409	0.047	3	$40.00	61%	100.0%	100.0%	3.5	0	0	0	0	0	0
3004	Behavioral	Home Energy Reports	SF	N/A	NC	2%	82	0.009	1	$0.00	100%	100.0%	100.0%	#########	16	312	7	312	8	312
3005	Behavioral	Home Energy Management System	SF	N/A	NC	3%	151	0.017	5	$90.00	61%	100.0%	100.0%	0.9	0	0	0	0	0	0
3006	Behavioral	Pre-pay	SF	N/A	NC	5%	236	0.027	3	$40.00	61%	100.0%	100.0%	2.0	0	0	0	0	0	0
3007	Behavioral	Home Energy Reports	MF	N/A	Retrofit	2%	167	0.019	1	$0.00	100%	100.0%	100.0%	#########	190	190	88	190	99	190
3008	Behavioral	Home Energy Management System	MF	N/A	Retrofit	3%	307	0.035	5	$90.00	61%	100.0%	100.0%	1.9	0	0	0	0	0	0

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
3009	Behavioral	Pre-pay	MF	N/A	Retrofit	5%	478	0.055	3	$40.00	61%	100.0%	100.0%	4.1	0	0	0	0	0	0
3010	Behavioral	Home Energy Reports	MF	N/A	NC	2%	49	0.006	1	$0.00	100%	100.0%	100.0%	#########	0	6	0	6	0	6
3011	Behavioral	Home Energy Management System	MF	N/A	NC	3%	91	0.010	5	$90.00	61%	100.0%	100.0%	0.6	0	0	0	0	0	0
3012	Behavioral	Pre-pay	MF	N/A	NC	5%	141	0.016	3	$40.00	61%	100.0%	100.0%	1.2	0	0	0	0	0	0
3013	Behavioral	Home Energy Reports	SF	N/A	Retrofit	2%	143	0.016	1	$0.00	100%	100.0%	100.0%	#########	39,774	39,774	22,022	39,774	20,609	39,774
3014	Behavioral	Home Energy Management System	SF	N/A	Retrofit	3%	263	0.030	5	$90.00	61%	100.0%	100.0%	1.6	0	0	0	0	0	0
3015	Behavioral	Pre-pay	SF	N/A	Retrofit	5%	409	0.047	3	$40.00	61%	100.0%	100.0%	3.5	0	0	0	0	0	0
3016	Behavioral	Home Energy Reports	SF	N/A	NC	2%	82	0.009	1	$0.00	100%	100.0%	100.0%	#########	243	5,238	134	5,238	126	5,238
3017	Behavioral	Home Energy Management System	SF	N/A	NC	3%	151	0.017	5	$90.00	61%	100.0%	100.0%	0.9	0	0	0	0	0	0
3018	Behavioral	Pre-pay	SF	N/A	NC	5%	236	0.027	3	$40.00	61%	100.0%	100.0%	2.0	0	0	0	0	0	0
3019	Behavioral	Home Energy Reports	MF	N/A	Retrofit	2%	167	0.019	1	$0.00	100%	100.0%	100.0%	#########	2,066	2,066	1,144	2,066	1,071	2,066
3020	Behavioral	Home Energy Management System	MF	N/A	Retrofit	3%	307	0.035	5	$90.00	61%	100.0%	100.0%	1.9	0	0	0	0	0	0
3021	Behavioral	Pre-pay	MF	N/A	Retrofit	5%	478	0.055	3	$40.00	61%	100.0%	100.0%	4.1	0	0	0	0	0	0
3022	Behavioral	Home Energy Reports	MF	N/A	NC	2%	49	0.006	1	$0.00	100%	100.0%	100.0%	#########	14	301	8	301	7	301
3023	Behavioral	Home Energy Management System	MF	N/A	NC	3%	91	0.010	5	$90.00	61%	100.0%	100.0%	0.6	0	0	0	0	0	0
3024	Behavioral	Pre-pay	MF	N/A	NC	5%	141	0.016	3	$40.00	61%	100.0%	100.0%	1.2	0	0	0	0	0	0
4001	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	SF	NLI	ER1	19%	233	0.566	6	$3,077.00	8%	82.1%	16.5%	2.3	665	3,547	60	3,021	58	637
4002	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	SF	NLI	ER2	13%	144	0.350	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	4,391	0	2,721	0	392
4003	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	SF	NLI	ER3	13%	144	0.350	18	$117.00	100%	82.1%	58.0%	7.3	0	732	0	84	0	74
4004	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (13 SEER baseline)	SF	NLI	MO	19%	233	0.566	18	$221.00	100%	82.1%	58.0%	6.2	793	0	71	8,839	77	6,281
4005	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (14 SEER baseline)	SF	NLI	MO	13%	144	0.350	18	$117.00	100%	82.1%	58.0%	7.3	0	7,851	0	0	0	0
4006	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	SF	NLI	ER1	28%	345	0.839	6	$3,476.00	7%	82.1%	16.2%	3.4	985	5,255	88	4,476	84	925
4007	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	SF	NLI	ER2	22%	256	0.623	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	7,807	0	4,837	0	682
4008	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	SF	NLI	ER3	22%	256	0.623	18	$516.00	48%	82.1%	33.7%	6.0	0	1,301	0	150	0	128
4009	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (13 SEER baseline)	SF	NLI	MO	28%	345	0.839	18	$620.00	40%	82.1%	29.9%	8.1	1,174	0	105	13,096	99	5,268
4010	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (14 SEER baseline)	SF	NLI	MO	22%	256	0.623	18	$516.00	48%	82.1%	33.7%	6.0	0	13,957	0	0	0	0
4011	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	NLI	ER1	61%	9,216	0.839	6	$4,867.00	4%	82.1%	14.9%	19.8	690	3,681	40	3,136	37	599
4012	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	NLI	ER2	61%	9,127	0.623	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	7,292	0	4,085	0	574
4013	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	NLI	ER3	61%	9,127	0.623	18	$3,267.00	5%	82.1%	15.5%	47.5	0	1,215	0	92	0	78
4014	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	NLI	MO	61%	9,216	0.839	18	$3,267.00	5%	82.1%	15.5%	50.5	767	12,270	89	16,133	85	3,702
4015	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	NLI	ER1	63%	9,554	1.057	6	$6,052.00	3%	82.1%	14.7%	21.4	716	3,816	42	3,251	46	611
4016	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	NLI	ER2	63%	9,466	0.841	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	7,562	0	4,236	0	595
4017	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	NLI	ER3	63%	9,466	0.841	18	$4,452.00	4%	82.1%	15.0%	51.7	0	1,260	0	95	0	96
4018	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	NLI	MO	63%	9,554	1.057	18	$4,452.00	4%	82.1%	15.0%	54.6	795	12,721	46	8,363	43	1,860
4019	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - furnace baseline	SF	NLI	MO	69%	10,350	0.839	18	$2,422.00	51%	82.1%	34.9%	7.3	861	13,781	50	9,059	15	3,116
4020	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - furnace baseline	SF	NLI	MO	70%	10,632	1.057	18	$3,607.00	51%	82.1%	34.9%	5.3	885	14,156	51	9,306	16	3,201
4021	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	SF	NLI	ER1	63%	9,554	1.057	6	$4,815.00	51%	82.1%	34.9%	1.5	716	3,816	42	3,251	13	1,371
4022	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	SF	NLI	ER2	63%	9,466	0.841	9	$0.00	35%	82.1%	27.7%	#DIV/0!	0	5,671	0	3,841	0	912
4023	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	SF	NLI	ER3	63%	9,466	0.841	15	$3,215.00	51%	82.1%	34.9%	4.8	0	3,151	0	491	0	120
4024	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	SF	NLI	MO	63%	9,554	1.057	15	$3,215.00	51%	82.1%	34.9%	5.1	954	12,721	55	9,503	17	3,329
4025	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - furnace baseline	SF	NLI	ER1	69%	10,473	1.219	8	$11,871.00	1%	82.1%	14.3%	31.0	784	5,578	0	0	0	0
4026	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - furnace baseline	SF	NLI	ER2	69%	10,385	1.003	17	$0.00	35%	82.1%	27.7%	#DIV/0!	0	8,296	0	0	0	0
4027	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - furnace baseline	SF	NLI	ER3	69%	10,385	1.003	25	$10,271.00	2%	82.1%	14.3%	72.4	0	0	0	0	0	0
4028	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - furnace baseline	SF	NLI	MO	69%	10,473	1.219	25	$10,271.00	2%	82.1%	14.3%	76.1	628	11,155	36	6,685	5	944
4029	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	SF	NLI	ER1	15%	1,068	0.582	6	$4,867.00	4%	82.1%	14.9%	4.7	24	127	1	108	1	21
4030	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	SF	NLI	ER2	9%	587	0.407	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	139	0	78	0	11
4031	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	SF	NLI	ER3	9%	587	0.407	18	$724.00	24%	82.1%	24.2%	7.5	0	23	0	2	0	1
4032	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	SF	NLI	MO	15%	1,068	0.582	18	$724.00	24%	82.1%	23.5%	11.7	30	0	2	312	2	105
4033	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	SF	NLI	MO	9%	587	0.407	18	$421.00	42%	82.1%	30.5%	7.5	0	261	0	0	0	0
4034	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	SF	NLI	ER1	20%	1,414	0.786	6	$6,052.00	3%	82.1%	14.7%	6.3	31	168	2	143	2	27
4035	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	SF	NLI	ER2	14%	933	0.611	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	222	0	124	0	17
4036	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	SF	NLI	ER3	14%	933	0.611	18	$1,909.00	9%	82.1%	24.2%	11.4	0	37	0	3	0	3
4037	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	SF	NLI	MO	20%	1,414	0.786	18	$1,909.00	9%	82.1%	16.9%	15.7	39	0	2	414	2	103
4038	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	SF	NLI	MO	14%	933	0.611	18	$1,606.00	11%	82.1%	17.5%	11.4	0	415	0	0	0	0
4039	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	SF	NLI	MO	33%	2,348	0.582	18	$2,735.00	51%	82.1%	34.9%	1.7	0	0	0	0	0	0
4040	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	SF	NLI	MO	28%	1,867	0.407	18	$2,432.00	51%	82.1%	34.9%	1.3	0	0	0	0	0	0
4041	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	SF	NLI	MO	37%	2,630	0.786	18	$3,920.00	51%	82.1%	34.9%	1.5	0	0	0	0	0	0
4042	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	SF	NLI	MO	33%	2,149	0.611	18	$3,617.00	51%	82.1%	34.9%	1.2	0	0	0	0	0	0
4043	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - hp baseline	SF	NLI	ER1	20%	1,389	0.729	6	$4,815.00	51%	82.1%	34.9%	0.4	0	0	0	0	0	0
4044	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - hp baseline	SF	NLI	ER2	14%	933	0.611	9	$0.00	35%	82.1%	27.7%	#DIV/0!	0	0	0	0	0	0
4045	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - hp baseline	SF	NLI	ER3	14%	933	0.611	15	$369.00	51%	82.1%	34.9%	9.3	0	0	0	0	0	0
4046	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (14/8.2 hp baseline)	SF	NLI	MO	20%	1,414	0.786	15	$672.00	51%	82.1%	34.9%	7.0	0	0	0	0	0	0
4047	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (15/8.8 hp baseline)	SF	NLI	MO	14%	933	0.611	15	$369.00	51%	82.1%	34.9%	9.3	0	0	0	0	0	0
4048	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - hp baseline	SF	NLI	ER1	33%	2,358	0.937	8	$11,871.00	1%	82.1%	24.2%	11.3	0	0	0	0	0	0
4049	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - hp baseline	SF	NLI	ER2	28%	1,877	0.762	17	$0.00	35%	82.1%	27.7%	#DIV/0!	0	0	0	0	0	0
4050	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - hp baseline	SF	NLI	ER3	28%	1,877	0.762	25	$7,425.00	2%	82.1%	24.2%	21.7	0	0	0	0	0	0
4051	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - (14/8.2 hp baseline)	SF	NLI	MO	33%	2,358	0.937	25	$7,728.00	2%	82.1%	24.2%	26.9	0	0	0	0	0	0
4052	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - (15/8.8 hp baseline)	SF	NLI	MO	28%	1,877	0.762	25	$7,425.00	2%	82.1%	24.2%	21.7	0	0	0	0	0	0
4053	HVAC Equipment	Smart Thermostat - Furnace baseline	SF	NLI	Retrofit	13%	1,903	0.210	15	$250.00	26%	82.1%	24.3%	25.5	916	13,681	181	10,826	184	3,319
4054	HVAC Equipment	Smart Thermostat - hp baseline	SF	NLI	Retrofit	13%	902	0.182	15	$250.00	26%	82.1%	34.6%	14.4	66	986	25	800	23	341
4055	HVAC Equipment	Filter Whistle - furnace baseline	SF	NLI	DI	3%	528	0.106	14	$5.00	100%	82.1%	58.0%	103.7	111	2,205	10	1,189	8	771

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
4056	HVAC Equipment	Filter Whistle - furnace baseline	SF	NLI	Retrofit	3%	528	0.106	14	$5.00	100%	100.0%	100.0%	103.7	158	2,205	159	2,205	159	2,205
4057	HVAC Equipment	Filter Whistle - hp baseline	SF	NLI	DI	4%	248	0.092	14	$5.00	100%	82.1%	58.0%	63.5	8	157	1	85	1	55
4058	HVAC Equipment	Filter Whistle - hp baseline	SF	NLI	Retrofit	4%	248	0.092	14	$5.00	100%	100.0%	100.0%	63.5	11	157	11	157	11	157
4059	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	SF	LI	ER1	19%	233	0.566	6	$3,077.00	8%	82.1%	16.5%	2.3	226	1,208	45	1,029	37	217
4060	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	SF	LI	ER2	13%	144	0.350	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	1,495	0	1,078	0	134
4061	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	SF	LI	ER3	13%	144	0.350	18	$117.00	100%	82.1%	58.0%	7.3	0	249	0	61	0	44
4062	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (13 SEER baseline)	SF	LI	MO	19%	233	0.566	18	$221.00	100%	82.1%	58.0%	6.2	270	0	53	3,301	44	2,346
4063	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (14 SEER baseline)	SF	LI	MO	13%	144	0.350	18	$117.00	100%	82.1%	58.0%	7.3	0	2,673	0	0	0	0
4064	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	SF	LI	ER1	28%	345	0.839	6	$3,476.00	7%	82.1%	16.2%	3.4	335	1,789	66	1,524	53	315
4065	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	SF	LI	ER2	22%	256	0.623	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	2,658	0	1,916	0	234
4066	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	SF	LI	ER3	22%	256	0.623	18	$516.00	48%	82.1%	33.7%	6.0	0	443	0	108	0	76
4067	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (13 SEER baseline)	SF	LI	MO	28%	345	0.839	18	$620.00	40%	82.1%	29.9%	8.1	400	0	79	4,891	73	1,998
4068	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (14 SEER baseline)	SF	LI	MO	22%	256	0.623	18	$516.00	48%	82.1%	33.7%	6.0	0	4,752	0	0	0	0
4069	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	LI	ER1	61%	9,216	0.839	6	$4,867.00	4%	82.1%	14.9%	19.8	588	3,133	34	2,669	4	482
4070	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	LI	ER2	61%	9,127	0.623	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	6,207	0	3,477	0	321
4071	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	LI	ER3	61%	9,127	0.623	18	$3,267.00	5%	82.1%	15.5%	47.5	0	1,034	0	78	0	10
4072	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	SF	LI	MO	61%	9,216	0.839	18	$3,267.00	5%	82.1%	15.5%	50.5	653	10,445	38	6,866	5	1,052
4073	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	LI	ER1	63%	9,554	1.057	6	$6,052.00	3%	82.1%	14.7%	21.4	609	3,248	35	2,767	5	492
4074	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	LI	ER2	63%	9,466	0.841	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	6,437	0	3,606	0	328
4075	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	LI	ER3	63%	9,466	0.841	18	$4,452.00	4%	82.1%	15.0%	51.7	0	1,073	0	81	0	10
4076	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	SF	LI	MO	63%	9,554	1.057	18	$4,452.00	4%	82.1%	15.0%	54.6	677	10,828	39	7,118	5	1,057
4077	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	SF	LI	ER1	15%	1,068	0.582	6	$4,867.00	4%	82.1%	24.2%	4.7	8	43	2	37	2	11
4078	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	SF	LI	ER2	9%	587	0.407	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	47	0	36	0	6
4079	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	SF	LI	ER3	9%	587	0.407	18	$724.00	24%	82.1%	24.2%	7.5	0	8	0	3	0	2
4080	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	SF	LI	MO	15%	1,068	0.582	18	$724.00	24%	82.1%	24.2%	11.7	10	0	3	128	2	43
4081	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	SF	LI	MO	9%	587	0.407	18	$421.00	42%	82.1%	30.5%	7.5	0	89	0	0	0	0
4082	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	SF	LI	ER1	20%	1,414	0.786	6	$6,052.00	3%	82.1%	24.2%	6.3	11	57	3	49	3	15
4083	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	SF	LI	ER2	14%	933	0.611	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	75	0	57	0	10
4084	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	SF	LI	ER3	14%	933	0.611	18	$1,909.00	9%	82.1%	24.2%	11.4	0	13	0	4	0	3
4085	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	SF	LI	MO	20%	1,414	0.786	18	$1,909.00	9%	82.1%	24.2%	15.7	13	0	4	169	3	56
4086	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	SF	LI	MO	14%	933	0.611	18	$1,606.00	11%	82.1%	24.2%	11.4	0	141	0	0	0	0
4087	HVAC Equipment	Programmable Thermostat - Furnace baseline	SF	LI	DI	7%	1,053	0.000	15	$60.00	100%	82.1%	58.0%	11.7	129	2,578	7	1,392	5	328
4088	HVAC Equipment	Programmable Thermostat - hp baseline	SF	LI	DI	7%	507	0.000	15	$60.00	100%	82.1%	58.0%	5.6	9	189	3	114	2	29
4089	HVAC Equipment	Filter Whistle - furnace baseline	SF	LI	DI	3%	528	0.106	14	$5.00	100%	82.1%	58.0%	103.7	75	1,501	4	783	3	186
4090	HVAC Equipment	Filter Whistle - hp baseline	SF	LI	DI	4%	248	0.092	14	$5.00	100%	82.1%	58.0%	63.5	5	107	0	56	0	13
4091	HVAC Equipment	ASHP Tune Up	SF	N/A	Retrofit	5%	354	0.131	5	$175.00	51%	82.1%	34.9%	2.1	120	535	24	456	18	203
4092	HVAC Equipment	Furnace Fan - furnace baseline	SF	N/A	Retrofit	3%	415	0.083	20	$98.65	51%	82.1%	34.9%	10.6	0	0	0	0	0	0
4093	HVAC Equipment	Furnace Fan - hp baseline	SF	N/A	Retrofit	6%	415	0.153	20	$98.65	51%	82.1%	34.9%	13.7	0	0	0	0	0	0
4094	HVAC Equipment	AC Tune Up	SF	N/A	Retrofit	5%	62	0.151	5	$175.00	34%	82.1%	27.4%	2.1	2,666	11,846	239	10,091	260	3,534
4095	HVAC Equipment	ENERGY STAR Room Air Conditioner	SF	N/A	MO	9%	18	0.078	14	$40.00	51%	82.1%	35.1%	0.5	31	384	0	0	0	0
4096	HVAC Equipment	Smart Room AC	SF	N/A	MO	3%	6	0.026	14	$205.00	51%	82.1%	35.1%	0.0	10	126	0	0	0	0
4097	HVAC Equipment	Smart Room AC - controls retrofit	SF	N/A	Retrofit	3%	6	0.026	14	$110.00	51%	82.1%	34.9%	0.1	8	105	0	0	0	0
4098	HVAC Equipment	Room Air Conditioner Recycling	SF	N/A	Recycle	100%	274	0.850	4	$129.00	100%	82.1%	58.0%	0.4	406	1,442	0	0	0	0
4099	HVAC Equipment	Smart Vents/Sensors - furnace baseline	SF	N/A	Retrofit	10%	1,509	0.302	15	$1,200.00	17%	82.1%	19.9%	7.8	1,464	8,250	299	10,873	230	2,729
4100	HVAC Equipment	Smart Vents/Sensors - hp baseline	SF	N/A	Retrofit	10%	709	0.262	15	$1,200.00	17%	82.1%	19.9%	4.8	105	589	21	776	16	195
4101	HVAC Equipment	Whole House Attic Fan	SF	N/A	Retrofit	27%	338	0.000	20	$700.00	51%	82.1%	34.9%	0.8	1,313	23,335	0	0	0	0
4102	HVAC Equipment	Attic Fan	SF	N/A	Retrofit	1%	10	0.000	20	$125.00	51%	82.1%	34.9%	0.1	170	3,025	0	0	0	0
4103	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (13 SEER baseline)	SF	N/A	NC	19%	233	0.566	18	$221.00	100%	82.1%	58.0%	6.2	55	0	5	697	5	498
4104	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (14 SEER baseline)	SF	N/A	NC	13%	144	0.350	18	$117.00	100%	82.1%	58.0%	7.3	0	589	0	0	0	0
4105	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (13 SEER baseline)	SF	N/A	NC	28%	345	0.839	18	$620.00	40%	82.1%	29.9%	8.1	81	0	7	1,033	7	410
4106	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (14 SEER baseline)	SF	N/A	NC	22%	256	0.623	18	$516.00	48%	82.1%	33.7%	6.0	0	1,048	0	0	0	0
4107	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	SF	N/A	NC	15%	1,068	0.582	18	$724.00	24%	82.1%	23.5%	11.7	8	0	0	99	1	32
4108	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	SF	N/A	NC	9%	587	0.407	18	$421.00	42%	82.1%	30.5%	7.5	0	78	0	0	0	0
4109	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	SF	N/A	NC	20%	1,414	0.786	18	$1,909.00	9%	82.1%	16.9%	15.7	11	0	1	131	1	32
4110	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	SF	N/A	NC	14%	933	0.611	18	$1,606.00	11%	82.1%	17.5%	11.4	0	124	0	0	0	0
4111	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (14/8.2 hp baseline)	SF	N/A	NC	20%	1,414	0.786	15	$672.00	51%	82.1%	34.9%	7.0	11	0	2	156	2	70
4112	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (15/8.8 hp baseline)	SF	N/A	NC	14%	933	0.611	15	$369.00	51%	82.1%	34.9%	9.3	0	124	0	0	0	0
4113	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - (14/8.2 hp baseline)	SF	N/A	NC	33%	2,358	0.937	25	$7,728.00	2%	82.1%	14.5%	26.9	18	31	4	227	3	49
4114	HVAC Equipment	Ground Source Heat Pump (19.1 EER 3.6 COP) - (15/8.8 hp baseline)	SF	N/A	NC	28%	1,877	0.762	25	$7,425.00	2%	82.1%	14.5%	21.7	0	224	0	0	0	0
4115	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	SF	N/A	NC	33%	2,348	0.582	18	$2,735.00	51%	82.1%	34.9%	1.7	0	0	0	0	0	0
4116	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	SF	N/A	NC	28%	1,867	0.407	18	$2,432.00	51%	82.1%	34.9%	1.3	0	0	0	0	0	0
4117	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	SF	N/A	NC	37%	2,630	0.786	18	$3,920.00	51%	82.1%	34.9%	1.5	0	0	0	0	0	0
4118	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	SF	N/A	NC	33%	2,149	0.611	18	$3,617.00	51%	82.1%	34.9%	1.2	0	0	0	0	0	0
4119	HVAC Equipment	Smart Thermostat - hp baseline	SF	N/A	NC	13%	902	0.182	15	$250.00	26%	82.1%	34.6%	14.4	28	539	10	440	10	187
4120	HVAC Equipment	ENERGY STAR Room Air Conditioner	SF	N/A	NC	9%	18	0.078	14	$40.00	51%	82.1%	34.9%	0.5	1	24	0	0	0	0
4121	HVAC Equipment	Smart Room AC	SF	N/A	NC	3%	6	0.026	14	$205.00	51%	82.1%	34.9%	0.0	0	8	0	0	0	0
4122	HVAC Equipment	Smart Vents/Sensors - hp baseline	SF	N/A	NC	10%	709	0.262	15	$1,200.00	17%	82.1%	19.9%	4.8	62	461	13	616	10	153
4123	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	MF	NLI	ER1	19%	143	0.399	6	$2,051.33	12%	82.1%	18.0%	1.6	7	37	1	32	1	7
4124	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	MF	NLI	ER2	13%	88	0.247	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	46	0	29	0	4
4125	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	MF	NLI	ER3	13%	88	0.247	18	$43.33	100%	82.1%	58.0%	13.6	0	8	0	1	0	1
4126	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (13 SEER baseline)	MF	NLI	MO	19%	143	0.399	18	$147.33	100%	82.1%	58.0%	6.4	8	0	1	93	1	66

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
4127	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (14 SEER baseline)	MF	NLI	MO	13%	88	0.247	18	$43.33	100%	82.1%	58.0%	13.6	0	83	0	0	0	0
4128	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	MF	NLI	ER1	28%	211	0.591	6	$2,317.33	11%	82.1%	17.5%	2.3	10	55	1	47	1	11
4129	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	MF	NLI	ER2	22%	157	0.439	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	82	0	51	0	8
4130	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	MF	NLI	ER3	22%	157	0.439	18	$309.33	81%	82.1%	48.6%	4.2	0	14	0	2	0	1
4131	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (13 SEER baseline)	MF	NLI	MO	28%	211	0.591	18	$413.33	60%	82.1%	38.9%	5.6	12	0	1	138	1	69
4132	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (14 SEER baseline)	MF	NLI	MO	22%	157	0.439	18	$309.33	81%	82.1%	48.6%	4.2	0	147	0	0	0	0
4133	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	NLI	ER1	62%	7,524	0.591	6	$3,244.67	5%	82.1%	15.5%	15.7	69	365	4	311	4	62
4134	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	NLI	ER2	62%	7,470	0.439	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	726	0	406	0	59
4135	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	NLI	ER3	62%	7,470	0.439	18	$2,178.00	8%	82.1%	16.5%	38.1	0	121	0	9	0	8
4136	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	NLI	MO	62%	7,524	0.591	18	$2,178.00	8%	82.1%	16.5%	40.1	76	1,218	4	801	4	195
4137	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	NLI	ER1	64%	7,784	0.744	6	$4,034.67	4%	82.1%	15.2%	16.9	71	378	4	322	4	63
4138	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	NLI	ER2	64%	7,730	0.592	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	751	0	421	0	60
4139	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	NLI	ER3	64%	7,730	0.592	18	$2,968.00	6%	82.1%	15.7%	41.0	0	125	0	9	0	8
4140	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	NLI	MO	64%	7,784	0.744	18	$2,968.00	6%	82.1%	15.7%	43.1	79	1,260	5	828	4	192
4141	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	MF	NLI	ER1	64%	7,784	0.744	6	$3,210.00	51%	82.1%	34.9%	1.8	71	378	4	322	1	136
4142	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	MF	NLI	ER2	64%	7,730	0.592	9	$0.00	35%	82.1%	27.7%	#DIV/0!	0	563	0	381	0	91
4143	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	MF	NLI	ER3	64%	7,730	0.592	15	$2,143.33	51%	82.1%	34.9%	5.7	0	313	0	49	0	12
4144	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - furnace baseline	MF	NLI	MO	64%	7,784	0.744	15	$2,143.33	51%	82.1%	34.9%	6.0	95	1,260	5	941	2	330
4145	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - furnace baseline	MF	NLI	MO	70%	8,517	0.744	18	$1,614.67	51%	82.1%	34.9%	9.2	86	1,379	5	906	2	312
4146	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - furnace baseline	MF	NLI	MO	71%	8,675	0.744	18	$2,404.67	51%	82.1%	34.9%	6.3	88	1,404	5	923	2	318
4147	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	MF	NLI	ER1	15%	837	0.429	6	$3,244.67	5%	82.1%	15.5%	3.6	2	9	0	8	0	2
4148	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	MF	NLI	ER2	9%	454	0.300	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	10	0	6	0	1
4149	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	MF	NLI	ER3	9%	454	0.300	18	$482.67	36%	82.1%	28.2%	5.6	0	2	0	0	0	0
4150	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	MF	NLI	MO	15%	837	0.429	18	$482.67	36%	82.1%	28.2%	8.8	2	0	0	23	0	9
4151	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	MF	NLI	MO	9%	454	0.300	18	$179.67	97%	82.1%	56.6%	5.6	0	19	0	0	0	0
4152	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	MF	NLI	ER1	20%	1,107	0.579	6	$4,034.67	4%	82.1%	15.2%	4.8	2	12	0	11	0	2
4153	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	MF	NLI	ER2	14%	724	0.450	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	16	0	9	0	1
4154	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	MF	NLI	ER3	14%	724	0.450	18	$1,272.67	14%	82.1%	24.2%	8.6	0	3	0	0	0	0
4155	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	MF	NLI	MO	20%	1,107	0.579	18	$1,272.67	14%	82.1%	18.7%	11.8	3	0	0	30	0	8
4156	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	MF	NLI	MO	14%	724	0.450	18	$969.67	18%	82.1%	20.5%	8.6	0	30	0	0	0	0
4157	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	MF	NLI	MO	34%	1,892	0.429	18	$1,823.33	51%	82.1%	34.9%	2.0	0	0	0	0	0	0
4158	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	MF	NLI	MO	29%	1,508	0.300	18	$139.33	51%	82.1%	34.9%	17.6	0	0	0	0	0	0
4159	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	MF	NLI	MO	37%	2,109	0.579	18	$2,613.33	51%	82.1%	34.9%	1.7	0	0	0	0	0	0
4160	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	MF	NLI	MO	33%	1,725	0.450	18	$929.33	51%	82.1%	34.9%	3.7	0	0	0	0	0	0
4161	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - hp baseline	MF	NLI	ER1	19%	1,091	0.538	6	$3,210.00	51%	82.1%	34.9%	0.5	0	0	0	0	0	0
4162	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - hp baseline	MF	NLI	ER2	14%	724	0.450	9	$0.00	35%	82.1%	27.7%	#DIV/0!	0	0	0	0	0	0
4163	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - hp baseline	MF	NLI	ER3	14%	724	0.450	15	$145.00	51%	82.1%	34.9%	17.8	0	0	0	0	0	0
4164	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (14/8.2 hp baseline)	MF	NLI	MO	20%	1,107	0.579	15	$448.00	51%	82.1%	34.9%	7.9	0	0	0	0	0	0
4165	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (15/8.8 hp baseline)	MF	NLI	MO	14%	724	0.450	15	$145.00	51%	82.1%	34.9%	17.8	0	0	0	0	0	0
4166	HVAC Equipment	Smart Thermostat - Furnace baseline	MF	NLI	Retrofit	13%	1,532	0.148	15	$250.00	26%	82.1%	24.3%	19.9	53	798	11	631	11	193
4167	HVAC Equipment	Smart Thermostat - Furnace baseline	MF	NLI	DI	13%	1,532	0.148	15	$250.00	26%	100.0%	100.0%	19.9	40	798	40	598	40	598
4168	HVAC Equipment	Smart Thermostat - hp baseline	MF	NLI	Retrofit	13%	716	0.134	15	$250.00	26%	82.1%	34.6%	11.2	4	55	1	44	1	19
4169	HVAC Equipment	Smart Thermostat - hp baseline	MF	NLI	DI	13%	716	0.134	15	$250.00	26%	100.0%	100.0%	11.2	3	55	3	41	3	41
4170	HVAC Equipment	Filter Whistle - furnace baseline	MF	NLI	DI	4%	426	0.074	14	$5.00	100%	82.1%	58.0%	79.9	9	173	1	93	1	60
4171	HVAC Equipment	Filter Whistle - furnace baseline	MF	NLI	Retrofit	4%	426	0.074	14	$5.00	100%	100.0%	100.0%	79.9	12	173	13	173	13	173
4172	HVAC Equipment	Filter Whistle - hp baseline	MF	NLI	DI	4%	198	0.068	14	$5.00	100%	82.1%	58.0%	48.7	1	12	0	6	0	4
4173	HVAC Equipment	Filter Whistle - hp baseline	MF	NLI	Retrofit	4%	198	0.068	14	$5.00	100%	100.0%	100.0%	48.7	1	12	1	12	1	12
4174	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	MF	LI	ER1	19%	143	0.399	6	$2,051.33	12%	82.1%	18.0%	1.6	8	45	2	38	1	9
4175	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	MF	LI	ER2	13%	88	0.247	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	56	0	40	0	5
4176	HVAC Equipment	ENERGY STAR Central AC - 16 SEER	MF	LI	ER3	13%	88	0.247	18	$43.33	100%	82.1%	58.0%	13.6	0	9	0	2	0	2
4177	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (13 SEER baseline)	MF	LI	MO	19%	143	0.399	18	$147.33	100%	82.1%	58.0%	6.4	10	0	2	123	2	87
4178	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (14 SEER baseline)	MF	LI	MO	13%	88	0.247	18	$43.33	100%	82.1%	58.0%	13.6	0	99	0	0	0	0
4179	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	MF	LI	ER1	28%	211	0.591	6	$2,317.33	11%	82.1%	17.5%	2.3	12	67	2	57	2	13
4180	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	MF	LI	ER2	22%	157	0.439	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	99	0	71	0	9
4181	HVAC Equipment	ENERGY STAR Central AC - 18 SEER	MF	LI	ER3	22%	157	0.439	18	$309.33	81%	82.1%	48.6%	4.2	0	16	0	4	0	3
4182	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (13 SEER baseline)	MF	LI	MO	28%	211	0.591	18	$413.33	60%	82.1%	38.9%	5.6	15	0	3	182	3	93
4183	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (14 SEER baseline)	MF	LI	MO	22%	157	0.439	18	$309.33	81%	82.1%	48.6%	4.2	0	177	0	0	0	0
4184	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	LI	ER1	62%	7,524	0.591	6	$3,244.67	5%	82.1%	15.5%	15.7	165	879	10	749	1	141
4185	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	LI	ER2	62%	7,470	0.439	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	1,745	0	978	0	94
4186	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	LI	ER3	62%	7,470	0.439	18	$2,178.00	8%	82.1%	16.5%	38.1	0	291	0	22	0	3
4187	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - furnace baseline	MF	LI	MO	62%	7,524	0.591	18	$2,178.00	8%	82.1%	16.5%	40.1	183	2,930	11	1,926	2	313
4188	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	LI	ER1	64%	7,784	0.744	6	$4,034.67	4%	82.1%	15.2%	16.9	171	909	10	775	1	142
4189	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	LI	ER2	64%	7,730	0.592	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	1,806	0	1,012	0	95
4190	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	LI	ER3	64%	7,730	0.592	18	$2,968.00	6%	82.1%	15.7%	41.0	0	301	0	23	0	3
4191	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - furnace baseline	MF	LI	MO	64%	7,784	0.744	18	$2,968.00	6%	82.1%	15.7%	43.1	189	3,031	11	1,993	2	309
4192	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	MF	LI	ER1	15%	837	0.429	6	$3,244.67	5%	82.1%	24.2%	3.6	2	11	1	10	1	3
4193	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	MF	LI	ER2	9%	454	0.300	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	12	0	9	0	2
4194	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - hp baseline	MF	LI	ER3	9%	454	0.300	18	$482.67	36%	82.1%	28.2%	5.6	0	2	0	1	0	1
4195	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	MF	LI	MO	15%	837	0.429	18	$482.67	36%	82.1%	28.2%	8.8	3	0	1	33	1	13
4196	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	MF	LI	MO	9%	454	0.300	18	$179.67	97%	82.1%	56.6%	5.6	0	23	0	0	0	0
4197	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	MF	LI	ER1	20%	1,107	0.579	6	$4,034.67	4%	82.1%	24.2%	4.8	3	15	1	13	1	4

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
4198	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	MF	LI	ER2	14%	724	0.450	12	$0.00	35%	82.1%	27.7%	#DIV/0!	0	19	0	15	0	3
4199	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - hp baseline	MF	LI	ER3	14%	724	0.450	18	$1,272.67	14%	82.1%	24.2%	8.6	0	3	0	1	0	1
4200	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	MF	LI	MO	20%	1,107	0.579	18	$1,272.67	14%	82.1%	24.2%	11.8	3	0	1	44	1	15
4201	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	MF	LI	MO	14%	724	0.450	18	$969.67	18%	82.1%	24.2%	8.6	0	36	0	0	0	0
4202	HVAC Equipment	Programmable Thermostat - Furnace baseline	MF	LI	DI	7%	845	0.000	15	$60.00	100%	82.1%	58.0%	9.4	53	1,057	3	571	2	135
4203	HVAC Equipment	Programmable Thermostat - hp baseline	MF	LI	DI	7%	401	0.000	15	$60.00	100%	82.1%	58.0%	4.4	4	74	1	44	1	11
4204	HVAC Equipment	Filter Whistle - furnace baseline	MF	LI	DI	4%	426	0.074	14	$5.00	100%	82.1%	58.0%	79.9	21	416	1	217	1	51
4205	HVAC Equipment	Filter Whistle - hp baseline	MF	LI	DI	4%	198	0.068	14	$5.00	100%	82.1%	58.0%	48.7	1	28	0	15	0	4
4206	HVAC Equipment	ASHP Tune Up	MF	N/A	Retrofit	5%	282	0.097	5	$175.00	51%	82.1%	34.9%	1.6	15	66	3	56	2	25
4207	HVAC Equipment	Furnace Fan - furnace baseline	MF	N/A	Retrofit	3%	415	0.072	20	$98.65	51%	82.1%	34.9%	10.1	0	0	0	0	0	0
4208	HVAC Equipment	Furnace Fan - hp baseline	MF	N/A	Retrofit	7%	415	0.142	20	$98.65	51%	82.1%	34.9%	13.2	0	0	0	0	0	0
4209	HVAC Equipment	AC Tune Up	MF	N/A	Retrofit	5%	38	0.106	5	$175.00	34%	82.1%	27.4%	1.5	46	205	4	175	5	61
4210	HVAC Equipment	ENERGY STAR Room Air Conditioner	MF	N/A	MO	9%	18	0.078	14	$40.00	51%	82.1%	35.1%	0.5	1	12	0	0	0	0
4211	HVAC Equipment	Smart Room AC	MF	N/A	MO	3%	6	0.026	14	$205.00	51%	82.1%	35.1%	0.0	0	4	0	0	0	0
4212	HVAC Equipment	Smart Room AC - controls retrofit	MF	N/A	Retrofit	3%	6	0.026	14	$110.00	51%	82.1%	34.9%	0.1	0	3	0	0	0	0
4213	HVAC Equipment	Room Air Conditioner Recycling	MF	N/A	Recycle	100%	274	0.850	4	$129.00	100%	82.1%	58.0%	0.4	12	44	0	0	0	0
4214	HVAC Equipment	Smart Vents/Sensors - furnace baseline	MF	N/A	Retrofit	10%	1,217	0.213	15	$720.00	17%	82.1%	20.2%	9.6	189	1,064	39	1,402	27	356
4215	HVAC Equipment	Smart Vents/Sensors - hp baseline	MF	N/A	Retrofit	10%	565	0.193	15	$720.00	17%	82.1%	20.2%	5.9	13	72	3	95	2	24
4216	HVAC Equipment	Whole House Attic Fan	MF	N/A	Retrofit	44%	338	0.000	20	$700.00	51%	82.1%	34.9%	0.8	37	659	0	0	0	0
4217	HVAC Equipment	Attic Fan	MF	N/A	Retrofit	1%	10	0.000	20	$125.00	51%	82.1%	34.9%	0.1	5	90	0	0	0	0
4218	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (13 SEER baseline)	MF	N/A	NC	19%	143	0.399	18	$147.33	100%	82.1%	58.0%	6.4	1	0	0	12	0	9
4219	HVAC Equipment	ENERGY STAR Central AC - 16 SEER (14 SEER baseline)	MF	N/A	NC	13%	88	0.247	18	$43.33	100%	82.1%	58.0%	13.6	0	10	0	0	0	0
4220	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (13 SEER baseline)	MF	N/A	NC	28%	211	0.591	18	$413.33	60%	82.1%	38.9%	5.6	1	0	0	18	0	9
4221	HVAC Equipment	ENERGY STAR Central AC - 18 SEER (14 SEER baseline)	MF	N/A	NC	22%	157	0.439	18	$309.33	81%	82.1%	48.6%	4.2	0	18	0	0	0	0
4222	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	MF	N/A	NC	15%	837	0.429	18	$482.67	36%	82.1%	28.2%	8.8	2	0	0	20	0	7
4223	HVAC Equipment	ENERGY STAR ASHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	MF	N/A	NC	9%	454	0.300	18	$179.67	97%	82.1%	56.6%	5.6	0	15	0	0	0	0
4224	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	MF	N/A	NC	20%	1,107	0.579	18	$1,272.67	14%	82.1%	18.7%	11.8	2	0	0	26	0	7
4225	HVAC Equipment	ENERGY STAR ASHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	MF	N/A	NC	14%	724	0.450	18	$969.67	18%	82.1%	20.5%	8.6	0	24	0	0	0	0
4226	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (14/8.2 hp baseline)	MF	N/A	NC	20%	1,107	0.579	15	$448.00	51%	82.1%	34.9%	7.9	1	0	0	16	0	7
4227	HVAC Equipment	Ductless Heat Pump 20 SEER 10.0 HSPF - (15/8.8 hp baseline)	MF	N/A	NC	14%	724	0.450	15	$145.00	51%	82.1%	34.9%	17.8	0	12	0	0	0	0
4228	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (14/8.2 hp baseline)	MF	N/A	NC	34%	1,892	0.429	18	$1,823.33	51%	82.1%	34.9%	2.0	0	0	0	0	0	0
4229	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (15/8.8 hp baseline)	MF	N/A	NC	29%	1,508	0.300	18	$139.33	51%	82.1%	34.9%	17.6	0	0	0	0	0	0
4230	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (14/8.2 hp baseline)	MF	N/A	NC	37%	2,109	0.579	18	$2,613.33	51%	82.1%	34.9%	1.7	0	0	0	0	0	0
4231	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (15/8.8 hp baseline)	MF	N/A	NC	33%	1,725	0.450	18	$929.33	51%	82.1%	34.9%	3.7	0	0	0	0	0	0
4232	HVAC Equipment	Smart Thermostat - hp baseline	MF	N/A	NC	13%	716	0.134	15	$250.00	26%	82.1%	34.6%	11.2	3	68	1	56	1	24
4233	HVAC Equipment	ENERGY STAR Room Air Conditioner	MF	N/A	NC	9%	18	0.078	14	$40.00	51%	82.1%	34.9%	0.5	0	1	0	0	0	0
4234	HVAC Equipment	Smart Room AC	MF	N/A	NC	3%	6	0.026	14	$205.00	51%	82.1%	34.9%	0.0	0	0	0	0	0	0
4235	HVAC Equipment	Smart Vents/Sensors - hp baseline	MF	N/A	NC	10%	565	0.193	15	$720.00	17%	82.1%	20.2%	5.9	8	58	2	78	1	20
4236	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	NLI	MO	21%	415	0.000	15	$1,536.15	16%	82.1%	39.9%	2.8	2,163	28,837	409	9,767	349	5,010
4237	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	NLI	MO	0%	0	0.000	15	$1,438.00	14%	82.1%	39.9%	2.2	0	0	0	0	0	0
4238	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	SF	NLI	MO	-144%	-2,862	0.888	18	$2,011.00	36%	82.1%	51.2%	2.3	0	0	0	0	0	0
4239	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	SF	NLI	MO	-157%	-2,961	0.660	18	$1,907.00	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4240	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	SF	NLI	MO	-130%	-2,569	1.119	18	$3,196.00	36%	82.1%	51.2%	2.1	0	0	0	0	0	0
4241	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	SF	NLI	MO	-142%	-2,669	0.891	18	$3,092.00	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4242	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	SF	NLI	Retrofit	13%	267	0.222	15	$250.00	26%	82.1%	24.3%	13.5	1,940	28,962	112	20,857	79	6,124
4243	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	NLI	DI	4%	69	0.112	14	$5.00	100%	82.1%	58.0%	56.3	188	3,736	11	1,949	5	1,096
4244	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	NLI	Retrofit	4%	69	0.112	14	$5.00	100%	100.0%	100.0%	56.3	268	3,736	270	3,736	270	3,736
4245	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	LI	MO	21%	415	0.000	15	$1,536.15	16%	82.1%	51.2%	2.8	760	10,132	431	8,609	394	5,648
4246	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	LI	MO	0%	0	0.000	15	$1,438.00	14%	82.1%	51.2%	2.2	0	0	0	0	0	0
4247	HVAC Equipment	Programmable Thermostat - gas furnace / CAC baseline	SF	LI	DI	8%	166	0.000	15	$60.00	100%	82.1%	58.0%	4.5	316	6,298	18	3,401	7	710
4248	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	LI	DI	4%	69	0.112	14	$5.00	100%	82.1%	58.0%	56.3	132	2,625	8	1,369	3	290
4249	HVAC Equipment	Furnace Tune Up	SF	N/A	Retrofit	1%	30	0.000	5	$175.00	51%	82.1%	34.9%	0.6	859	3,817	0	0	0	0
4250	HVAC Equipment	Furnace Fan - gas furnace / CAC baseline	SF	N/A	Retrofit	21%	415	0.669	20	$98.65	36%	82.1%	28.1%	52.2	0	0	0	0	0	0
4251	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	SF	N/A	Retrofit	10%	198	0.320	15	$1,200.00	17%	82.1%	19.9%	4.8	2,723	15,345	556	20,223	428	5,075
4252	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	N/A	NC	21%	415	0.000	15	$1,536.15	16%	82.1%	39.9%	2.8	156	2,994	30	1,016	25	520
4253	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	N/A	NC	0%	0	0.000	15	$1,438.00	14%	82.1%	39.9%	2.2	0	0	0	0	0	0
4254	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	SF	N/A	NC	-144%	-2,862	0.888	18	$2,011.00	36%	82.1%	28.1%	2.3	0	0	0	0	0	0
4255	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	SF	N/A	NC	-157%	-2,961	0.660	18	$1,907.00	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4256	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	SF	N/A	NC	-130%	-2,569	1.119	18	$3,196.00	36%	82.1%	28.1%	2.1	0	0	0	0	0	0
4257	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	SF	N/A	NC	-142%	-2,669	0.891	18	$3,092.00	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4258	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	SF	N/A	NC	13%	267	0.222	15	$250.00	26%	82.1%	24.3%	12.6	202	4,348	12	3,253	8	957
4259	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	SF	N/A	NC	10%	198	0.320	15	$1,200.00	17%	82.1%	19.9%	4.8	433	3,509	88	4,674	68	1,162
4260	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	NLI	MO	32%	415	0.000	15	$1,056.82	24%	82.1%	39.9%	2.5	43	570	8	193	7	99
4261	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	NLI	MO	0%	0	0.000	15	$958.67	21%	82.1%	39.9%	1.8	0	0	0	0	0	0
4262	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	MF	NLI	MO	-190%	-2,469	0.638	18	$1,340.67	36%	82.1%	51.2%	2.2	0	0	0	0	0	0
4263	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	MF	NLI	MO	-204%	-2,529	0.474	18	$1,243.33	36%	82.1%	51.2%	1.5	0	0	0	0	0	0
4264	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	MF	NLI	MO	-173%	-2,250	0.804	18	$2,137.33	36%	82.1%	51.2%	2.1	0	0	0	0	0	0
4265	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	MF	NLI	MO	-186%	-2,310	0.640	18	$2,033.33	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4266	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	NLI	Retrofit	13%	174	0.160	15	$250.00	26%	82.1%	24.3%	10.0	16	237	1	171	1	50
4267	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	NLI	DI	13%	174	0.160	15	$250.00	26%	100.0%	100.0%	10.0	12	237	12	178	12	178
4268	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	NLI	DI	4%	45	0.080	14	$5.00	100%	82.1%	58.0%	40.6	2	48	0	25	0	14

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
4269	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	NLI	Retrofit	4%	45	0.080	14	$5.00	100%	100.0%	100.0%	40.6	3	48	3	48	3	48
4270	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	LI	MO	32%	415	0.000	15	$1,056.82	24%	82.1%	51.2%	2.5	53	709	30	603	28	395
4271	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	LI	MO	0%	0	0.000	15	$958.67	21%	82.1%	51.2%	1.8	0	0	0	0	0	0
4272	HVAC Equipment	Programmable Thermostat - gas furnace / CAC baseline	MF	LI	DI	8%	107	0.000	15	$60.00	100%	82.1%	58.0%	3.3	18	361	1	195	0	41
4273	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	LI	DI	4%	45	0.080	14	$5.00	100%	82.1%	58.0%	40.6	6	120	0	63	0	13
4274	HVAC Equipment	Furnace Tune Up	MF	N/A	Retrofit	2%	23	0.000	5	$175.00	51%	82.1%	34.9%	0.5	22	98	0	0	0	0
4275	HVAC Equipment	Furnace Fan - gas furnace / CAC baseline	MF	N/A	Retrofit	32%	415	0.734	20	$98.65	36%	82.1%	28.1%	56.4	0	0	0	0	0	0
4276	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	MF	N/A	Retrofit	10%	130	0.230	15	$720.00	17%	82.1%	20.2%	5.6	59	330	12	435	8	110
4277	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	N/A	NC	32%	415	0.000	15	$1,056.82	24%	82.1%	39.9%	2.5	11	211	2	72	2	37
4278	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	N/A	NC	0%	0	0.000	15	$958.67	21%	82.1%	39.9%	1.8	0	0	0	0	0	0
4279	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	MF	N/A	NC	-190%	-2,469	0.638	18	$1,347.33	36%	82.1%	28.1%	2.2	0	0	0	0	0	0
4280	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	MF	N/A	NC	-204%	-2,529	0.474	18	$1,243.33	36%	82.1%	28.1%	1.5	0	0	0	0	0	0
4281	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	MF	N/A	NC	-173%	-2,250	0.804	18	$2,137.33	36%	82.1%	28.1%	2.1	0	0	0	0	0	0
4282	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	MF	N/A	NC	-186%	-2,310	0.640	18	$2,033.33	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4283	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	N/A	NC	13%	174	0.160	15	$250.00	26%	82.1%	24.3%	9.2	9	200	1	149	0	44
4284	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	MF	N/A	NC	10%	130	0.230	15	$720.00	17%	82.1%	20.2%	5.6	20	162	4	216	3	54
5001	HVAC Shell	Attic Insulation - furnace baseline (R0 existing)	SF	NLI	DI	35%	7,998	0.928	25	$1,528.30	46%	82.0%	26.6%	14.5	788	5,108	47	5,114	15	2,187
5002	HVAC Shell	Attic Insulation - furnace baseline (R7 existing)	SF	NLI	DI	16%	2,899	0.493	25	$1,168.70	60%	82.0%	34.0%	5.8	597	3,869	36	3,873	11	1,947
5003	HVAC Shell	Attic Insulation - furnace baseline (R11 existing)	SF	NLI	DI	11%	1,917	0.173	25	$988.90	71%	82.0%	40.4%	3.3	437	2,831	26	2,833	9	1,694
5004	HVAC Shell	Attic Insulation - hp baseline (R0 existing)	SF	NLI	DI	34%	3,536	0.985	25	$1,528.30	46%	82.0%	26.6%	8.5	53	343	3	344	1	147
5005	HVAC Shell	Attic Insulation - hp baseline (R7 existing)	SF	NLI	DI	16%	1,289	0.597	25	$1,168.70	60%	82.0%	34.0%	4.0	40	261	2	262	1	132
5006	HVAC Shell	Attic Insulation - hp baseline (R11 existing)	SF	NLI	DI	11%	851	0.272	25	$988.90	71%	82.0%	40.4%	2.2	29	191	2	191	1	114
5007	HVAC Shell	Duct Sealing - furnace baseline	SF	NLI	DI	2%	274	0.061	20	$268.00	56%	82.0%	31.9%	2.4	102	663	9	707	7	443
5008	HVAC Shell	Duct Sealing - hp baseline	SF	NLI	DI	2%	130	0.068	20	$268.00	56%	82.0%	31.9%	1.7	7	48	1	51	1	32
5009	HVAC Shell	Infiltration Reduction - furnace baseline	SF	NLI	Retrofit	17%	2,542	0.440	15	$576.60	61%	82.0%	34.6%	7.1	619	3,007	57	3,910	63	2,640
5010	HVAC Shell	Infiltration Reduction - hp baseline	SF	NLI	Retrofit	15%	1,063	0.333	15	$576.60	61%	82.0%	34.6%	3.8	39	191	4	249	4	168
5011	HVAC Shell	Wall Insulation - furnace baseline	SF	NLI	Retrofit	35%	8,168	0.546	25	$2,696.40	61%	82.0%	34.6%	5.7	1,154	7,479	107	7,982	117	5,696
5012	HVAC Shell	Wall Insulation - hp baseline	SF	NLI	Retrofit	33%	3,508	0.639	25	$2,696.40	61%	82.0%	34.6%	3.1	75	488	7	521	8	372
5013	HVAC Shell	Basement Sidewall Insulation - furnace baseline	SF	NLI	Retrofit	4%	595	-0.047	25	$2,754.00	25%	82.0%	17.3%	0.7	50	325	0	0	0	0
5014	HVAC Shell	Basement Sidewall Insulation - hp baseline	SF	NLI	Retrofit	3%	190	-0.047	25	$2,754.00	25%	82.0%	17.3%	0.1	2	16	0	0	0	0
5015	HVAC Shell	Attic Insulation - furnace baseline (R0 existing)	SF	LI	DI	35%	7,998	0.928	25	$1,528.30	100%	82.0%	57.8%	6.3	268	1,739	16	1,741	11	665
5016	HVAC Shell	Attic Insulation - furnace baseline (R7 existing)	SF	LI	DI	16%	2,899	0.493	25	$1,168.70	100%	82.0%	57.8%	2.6	203	1,317	12	1,319	8	504
5017	HVAC Shell	Attic Insulation - furnace baseline (R11 existing)	SF	LI	DI	11%	1,917	0.173	25	$988.90	100%	82.0%	57.8%	1.4	149	964	9	965	6	368
5018	HVAC Shell	Attic Insulation - hp baseline (R0 existing)	SF	LI	DI	34%	3,536	0.985	25	$1,528.30	100%	82.0%	57.8%	3.7	18	117	1	117	1	45
5019	HVAC Shell	Attic Insulation - hp baseline (R7 existing)	SF	LI	DI	16%	1,289	0.597	25	$1,168.70	100%	82.0%	57.8%	1.7	14	89	1	89	1	34
5020	HVAC Shell	Attic Insulation - hp baseline (R11 existing)	SF	LI	DI	11%	851	0.272	25	$988.90	100%	82.0%	57.8%	1.0	10	65	1	65	0	25
5021	HVAC Shell	Duct Sealing - furnace baseline	SF	LI	DI	2%	274	0.061	20	$268.00	100%	82.0%	57.8%	0.9	35	226	3	241	2	92
5022	HVAC Shell	Duct Sealing - hp baseline	SF	LI	DI	2%	130	0.068	20	$268.00	100%	82.0%	57.8%	0.7	3	16	0	17	0	7
5023	HVAC Shell	Infiltration Reduction - furnace baseline	SF	LI	DI	17%	2,542	0.440	15	$576.60	69%	82.0%	39.5%	6.3	158	1,024	32	1,053	17	288
5024	HVAC Shell	Infiltration Reduction - hp baseline	SF	LI	DI	15%	1,063	0.333	15	$576.60	69%	82.0%	39.5%	3.3	10	65	2	67	1	18
5025	HVAC Shell	Wall Insulation - furnace baseline	SF	LI	Retrofit	35%	8,168	0.546	25	$2,696.40	100%	82.0%	57.8%	3.5	393	2,547	36	2,718	29	1,114
5026	HVAC Shell	Wall Insulation - hp baseline	SF	LI	Retrofit	33%	3,508	0.639	25	$2,696.40	100%	82.0%	57.8%	1.9	26	166	2	177	2	73
5027	HVAC Shell	Basement Sidewall Insulation - furnace baseline	SF	LI	Retrofit	4%	595	-0.047	25	$2,754.00	25%	82.0%	17.3%	0.7	17	111	0	0	0	0
5028	HVAC Shell	Basement Sidewall Insulation - hp baseline	SF	LI	Retrofit	3%	190	-0.047	25	$2,754.00	25%	82.0%	17.3%	0.1	1	5	0	0	0	0
5029	HVAC Shell	Radiant Barrier	SF	N/A	Retrofit	1%	69	0.157	20	$386.57	61%	82.0%	34.6%	1.7	164	1,063	15	1,134	17	810
5030	HVAC Shell	Cool Roof	SF	N/A	Retrofit	2%	127	0.288	20	$3,596.00	61%	82.0%	34.6%	0.3	2,169	14,055	0	0	0	0
5031	HVAC Shell	ENERGY STAR Windows - furnace baseline	SF	N/A	Retrofit	2%	236	0.119	25	$10,490.40	61%	82.0%	34.6%	0.1	49	314	0	0	0	0
5032	HVAC Shell	ENERGY STAR Windows - hp baseline	SF	N/A	Retrofit	2%	140	0.110	25	$10,490.40	61%	82.0%	34.6%	0.1	4	28	0	0	0	0
5033	HVAC Shell	ENERGY STAR Door - furnace baseline	SF	N/A	Retrofit	2%	319	0.064	25	$388.00	61%	82.0%	34.6%	2.0	71	461	7	492	7	351
5034	HVAC Shell	ENERGY STAR Door - hp baseline	SF	N/A	Retrofit	3%	197	0.073	25	$388.00	61%	82.0%	34.6%	1.6	7	43	1	46	1	33
5035	HVAC Shell	Smart Window Coverings - Film/Transformer - furnace baseline	SF	N/A	Retrofit	16%	2,338	0.468	7	$6,026.40	61%	82.0%	34.6%	0.3	491	1,112	0	0	0	0
5036	HVAC Shell	Smart Window Coverings - Film/Transformer - hp baseline	SF	N/A	Retrofit	16%	1,098	0.406	7	$6,026.40	61%	82.0%	34.6%	0.2	35	79	0	0	0	0
5037	HVAC Shell	Attic Insulation - furnace baseline (R0 existing)	MF	NLI	DI	46%	9,817	1.597	25	$1,904.00	37%	82.0%	22.0%	19.5	231	1,499	14	1,501	4	531
5038	HVAC Shell	Attic Insulation - furnace baseline (R7 existing)	MF	NLI	DI	24%	3,651	0.513	25	$1,456.00	48%	82.0%	27.9%	7.0	53	343	3	343	1	141
5039	HVAC Shell	Attic Insulation - furnace baseline (R11 existing)	MF	NLI	DI	18%	2,511	0.386	25	$1,232.00	57%	82.0%	32.3%	4.9	43	276	3	277	1	132
5040	HVAC Shell	Attic Insulation - hp baseline (R0 existing)	MF	NLI	DI	44%	4,245	1.411	25	$1,904.00	37%	82.0%	22.0%	11.1	15	95	1	95	0	34
5041	HVAC Shell	Attic Insulation - hp baseline (R7 existing)	MF	NLI	DI	23%	1,632	0.527	25	$1,456.00	48%	82.0%	27.9%	4.2	3	22	0	23	0	9
5042	HVAC Shell	Attic Insulation - hp baseline (R11 existing)	MF	NLI	DI	17%	1,126	0.396	25	$1,232.00	57%	82.0%	32.3%	3.0	3	18	0	18	0	9
5043	HVAC Shell	Duct Sealing - furnace baseline	MF	NLI	DI	6%	830	0.021	20	$165.60	91%	82.0%	51.8%	4.9	42	274	4	293	3	265
5044	HVAC Shell	Duct Sealing - hp baseline	MF	NLI	DI	6%	332	-0.014	20	$165.60	91%	82.0%	51.8%	1.6	2	16	0	17	0	16
5045	HVAC Shell	Infiltration Reduction - furnace baseline	MF	NLI	Retrofit	12%	1,402	0.123	15	$347.20	61%	82.0%	34.6%	5.5	50	244	5	317	5	214
5046	HVAC Shell	Infiltration Reduction - hp baseline	MF	NLI	Retrofit	10%	575	0.115	15	$347.20	61%	82.0%	34.6%	2.8	3	15	0	19	0	13
5047	HVAC Shell	Wall Insulation - furnace baseline	MF	NLI	Retrofit	34%	6,334	0.695	25	$1,688.40	61%	82.0%	34.6%	7.7	161	1,040	15	1,110	16	792
5048	HVAC Shell	Wall Insulation - hp baseline	MF	NLI	Retrofit	33%	2,734	0.617	25	$1,688.40	61%	82.0%	34.6%	4.1	10	66	1	70	1	50
5049	HVAC Shell	Attic Insulation - furnace baseline (R0 existing)	MF	LI	DI	46%	9,817	1.597	25	$1,904.00	84%	82.0%	48.0%	8.5	278	1,803	17	1,805	13	613
5050	HVAC Shell	Attic Insulation - furnace baseline (R7 existing)	MF	LI	DI	24%	3,651	0.513	25	$1,456.00	100%	82.0%	57.8%	3.0	64	412	4	412	3	158
5051	HVAC Shell	Attic Insulation - furnace baseline (R11 existing)	MF	LI	DI	18%	2,511	0.386	25	$1,232.00	100%	82.0%	57.8%	2.1	51	332	3	333	2	127
5052	HVAC Shell	Attic Insulation - hp baseline (R0 existing)	MF	LI	DI	44%	4,245	1.411	25	$1,904.00	84%	82.0%	48.0%	4.9	18	114	1	115	1	39
5053	HVAC Shell	Attic Insulation - hp baseline (R7 existing)	MF	LI	DI	23%	1,632	0.527	25	$1,456.00	100%	82.0%	57.8%	1.8	4	27	0	27	0	10
5054	HVAC Shell	Attic Insulation - hp baseline (R11 existing)	MF	LI	DI	17%	1,126	0.396	25	$1,232.00	100%	82.0%	70.1%	1.3	3	22	3	31	2	17
5055	HVAC Shell	Duct Sealing - furnace baseline	MF	LI	DI	6%	830	0.021	20	$165.60	100%	82.0%	57.8%	1.8	51	330	5	352	3	135

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
5056	HVAC Shell	Duct Sealing - hp baseline	MF	LI	DI	6%	332	-0.014	20	$165.60	100%	82.0%	57.8%	0.6	3	19	0	21	0	8
5057	HVAC Shell	Infiltration Reduction - furnace baseline	MF	LI	DI	12%	1,402	0.123	15	$347.20	100%	82.0%	57.8%	2.9	45	293	9	301	6	118
5058	HVAC Shell	Infiltration Reduction - hp baseline	MF	LI	DI	10%	575	0.115	15	$347.20	100%	82.0%	57.8%	1.5	3	18	1	18	0	7
5059	HVAC Shell	Wall Insulation - furnace baseline	MF	LI	Retrofit	34%	6,334	0.695	25	$1,688.40	100%	82.0%	57.8%	4.7	193	1,251	18	1,335	14	547
5060	HVAC Shell	Wall Insulation - hp baseline	MF	LI	Retrofit	33%	2,734	0.617	25	$1,688.40	100%	82.0%	57.8%	2.5	12	79	1	85	1	35
5061	HVAC Shell	ENERGY STAR Windows - furnace baseline	MF	N/A	Retrofit	1%	174	0.067	25	$6,316.80	61%	82.0%	34.6%	0.1	11	74	0	0	0	0
5062	HVAC Shell	ENERGY STAR Windows - hp baseline	MF	N/A	Retrofit	2%	100	0.079	25	$6,316.80	61%	82.0%	34.6%	0.1	1	6	0	0	0	0
5063	HVAC Shell	ENERGY STAR Door - furnace baseline	MF	N/A	Retrofit	3%	319	0.056	25	$194.00	61%	82.0%	34.6%	3.8	22	143	2	152	2	109
5064	HVAC Shell	ENERGY STAR Door - hp baseline	MF	N/A	Retrofit	3%	197	0.067	25	$194.00	61%	82.0%	34.6%	3.1	2	13	0	14	0	10
5065	HVAC Shell	Smart Window Coverings - Film/Transformer - furnace baseline	MF	N/A	Retrofit	16%	1,887	0.330	7	$3,628.80	61%	82.0%	34.6%	0.4	63	142	0	0	0	0
5066	HVAC Shell	Smart Window Coverings - Film/Transformer - hp baseline	MF	N/A	Retrofit	16%	875	0.299	7	$3,628.80	61%	82.0%	34.6%	0.3	4	10	0	0	0	0
5067	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	SF	NLI	DI	28%	784	0.504	25	$1,528.30	46%	82.0%	26.6%	5.2	995	6,444	60	6,451	35	3,188
5068	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	SF	NLI	DI	11%	249	0.335	25	$1,168.70	60%	82.0%	34.0%	2.4	607	3,935	37	3,939	20	2,324
5069	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	SF	NLI	DI	8%	171	0.217	25	$988.90	71%	82.0%	40.4%	1.6	624	4,045	38	4,049	18	2,634
5070	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	SF	NLI	DI	3%	51	0.041	20	$268.00	56%	82.0%	31.9%	1.2	291	1,887	41	2,134	34	1,386
5071	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	SF	NLI	Retrofit	12%	240	0.275	15	$576.60	61%	82.0%	34.6%	3.2	879	4,272	82	5,555	89	3,750
5072	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	SF	NLI	Retrofit	24%	615	0.410	25	$2,696.40	61%	82.0%	34.6%	2.0	1,092	7,076	101	7,552	111	5,389
5073	HVAC Shell	Basement Sidewall Insulation - gas furnace / CAC baseline	SF	NLI	Retrofit	11%	257	0.327	25	$2,754.00	25%	82.0%	17.3%	2.8	261	1,692	24	1,806	25	723
5074	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	SF	LI	DI	28%	784	0.504	25	$1,528.30	100%	82.0%	57.8%	2.3	349	2,264	32	2,416	25	991
5075	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	SF	LI	DI	11%	249	0.335	25	$1,168.70	100%	82.0%	57.8%	1.1	213	1,382	20	1,475	16	605
5076	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	SF	LI	DI	8%	171	0.217	25	$988.90	100%	82.0%	57.8%	0.7	219	1,421	20	1,517	16	622
5077	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	SF	LI	DI	3%	51	0.041	20	$268.00	100%	82.0%	57.8%	0.5	102	663	30	825	19	359
5078	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	SF	LI	DI	12%	240	0.275	15	$576.60	69%	82.0%	39.5%	2.8	232	1,501	67	1,567	47	439
5079	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	SF	LI	Retrofit	24%	615	0.410	25	$2,696.40	100%	82.0%	57.8%	1.2	384	2,486	36	2,653	28	1,088
5080	HVAC Shell	Basement Sidewall Insulation - gas furnace / CAC baseline	SF	LI	Retrofit	11%	257	0.327	25	$2,754.00	25%	82.0%	17.3%	2.8	92	595	9	635	6	100
5081	HVAC Shell	Radiant Barrier	SF	N/A	Retrofit	4%	84	0.192	20	$386.57	61%	82.0%	34.6%	2.1	146	949	14	1,013	15	723
5082	HVAC Shell	Cool Roof	SF	N/A	Retrofit	8%	153	0.352	20	$3,596.00	61%	82.0%	34.6%	0.4	2,214	14,346	0	0	0	0
5083	HVAC Shell	ENERGY STAR Windows - gas furnace / CAC baseline	SF	N/A	Retrofit	4%	82	0.016	25	$10,490.40	61%	82.0%	34.6%	0.0	240	1,556	0	0	0	0
5084	HVAC Shell	ENERGY STAR Door - gas furnace / CAC baseline	SF	N/A	Retrofit	1%	21	0.034	25	$388.00	61%	82.0%	34.6%	0.7	74	481	0	0	0	0
5085	HVAC Shell	Smart Window Coverings - Film/Transformer - gas furnace / CAC baseline	SF	N/A	Retrofit	16%	307	0.495	7	$6,026.40	61%	82.0%	34.6%	0.2	842	1,910	0	0	0	0
5086	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	MF	NLI	DI	45%	1,038	1.416	25	$1,904.00	37%	82.0%	22.0%	9.3	26	170	2	170	1	69
5087	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	MF	NLI	DI	22%	357	0.444	25	$1,456.00	48%	82.0%	27.9%	3.1	30	192	2	193	1	100
5088	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	MF	NLI	DI	18%	277	0.321	25	$1,232.00	57%	82.0%	32.3%	2.2	8	51	0	51	0	29
5089	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	MF	NLI	DI	8%	114	0.338	20	$165.60	91%	82.0%	51.8%	6.7	11	69	2	79	1	75
5090	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	MF	NLI	Retrofit	10%	130	0.194	15	$347.20	61%	82.0%	34.6%	3.4	10	48	1	63	1	42
5091	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	MF	NLI	Retrofit	27%	475	0.615	25	$1,688.40	61%	82.0%	34.6%	3.2	46	300	4	320	5	228
5092	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	MF	LI	DI	45%	1,038	1.416	25	$1,904.00	84%	82.0%	48.0%	4.1	33	211	3	225	2	77
5093	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	MF	LI	DI	22%	357	0.444	25	$1,456.00	100%	82.0%	57.8%	1.4	37	240	3	256	3	105
5094	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	MF	LI	DI	18%	277	0.321	25	$1,232.00	100%	82.0%	57.8%	1.0	10	63	1	68	1	28
5095	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	MF	LI	DI	8%	114	0.338	20	$165.60	100%	82.0%	57.8%	2.5	13	86	4	108	3	47
5096	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	MF	LI	DI	10%	130	0.194	15	$347.20	100%	82.0%	57.8%	1.8	9	60	3	63	2	25
5097	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	MF	LI	Retrofit	27%	475	0.615	25	$1,688.40	100%	82.0%	57.8%	2.0	58	373	5	398	4	163
5098	HVAC Shell	ENERGY STAR Windows - gas furnace / CAC baseline	MF	N/A	Retrofit	3%	39	0.077	25	$6,316.80	61%	82.0%	34.6%	0.1	4	26	0	0	0	0
5099	HVAC Shell	ENERGY STAR Door - gas furnace / CAC baseline	MF	N/A	Retrofit	2%	21	0.037	25	$194.00	61%	82.0%	34.6%	1.5	3	17	0	18	0	13
5100	HVAC Shell	Smart Window Coverings - Film/Transformer - gas furnace / CAC baseline	MF	N/A	Retrofit	16%	201	0.356	7	$3,628.80	61%	82.0%	34.6%	0.3	27	60	0	0	0	0
6001	Lighting	LED - standard bulb - interior	SF	NLI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0
6002	Lighting	LED - standard bulb - interior	SF	NLI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0
6003	Lighting	LED - standard bulb - interior	SF	LI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0
6004	Lighting	LED - specialty - interior	SF	NLI	MO	89%	32	0.039	15	$4.00	96%	83.1%	81.4%	7.8	2,428	21,753	1,546	19,301	1,507	19,060
6005	Lighting	LED - specialty - interior	SF	NLI	DI	70%	10	0.012	15	$9.50	100%	83.1%	83.1%	0.9	276	5,501	16	2,962	12	2,363
6006	Lighting	LED - specialty - interior	SF	LI	DI	70%	10	0.012	15	$9.50	100%	83.1%	83.1%	0.9	188	3,746	17	2,104	11	684
6007	Lighting	LED - reflector - interior	SF	NLI	MO	85%	29	0.036	15	$3.37	81%	83.1%	76.0%	9.9	0	0	0	0	0	0
6008	Lighting	LED - reflector - interior	SF	NLI	DI	70%	12	0.018	15	$9.50	100%	83.1%	83.1%	1.2	0	0	0	0	0	0
6009	Lighting	LED - reflector - interior	SF	LI	DI	70%	12	0.018	15	$9.50	100%	83.1%	83.1%	1.2	0	0	0	0	0	0
6010	Lighting	LED fixtures - interior	SF	N/A	MO	89%	47	0.055	15	$29.44	18%	83.1%	52.7%	8.5	0	0	0	0	0	0
6011	Lighting	LED nightlights	SF	N/A	DI	90%	5	0.005	16	$3.00	61%	100.0%	100.0%	2.0	24	472	24	378	24	378
6012	Lighting	LED - exterior	SF	N/A	MO	52%	23	0.010	15	$3.09	61%	83.1%	69.2%	7.9	0	0	0	0	0	0
6013	Lighting	Linear LED	SF	N/A	MO	44%	10	0.014	9	$2.50	61%	83.1%	69.2%	4.3	188	1,683	87	1,397	90	1,164
6014	Lighting	Residential Occupancy Sensors	SF	N/A	Retrofit	35%	28	0.035	10	$30.00	61%	83.1%	69.2%	1.1	959	9,549	178	3,172	183	2,642
6015	Lighting	Smart Lighting Switch_ET	SF	N/A	Retrofit	35%	29	0.036	10	$25.00	20%	83.1%	53.7%	3.9	981	9,767	730	12,978	739	8,394
6016	Lighting	Exterior Lighting Controls	SF	N/A	Retrofit	35%	65	0.026	10	$30.00	61%	83.1%	69.2%	1.7	640	6,374	298	5,294	305	4,409
6017	Lighting	LED - specialty - interior	SF	N/A	NC	89%	32	0.039	15	$4.00	96%	83.1%	81.4%	7.8	378	7,389	241	6,124	235	6,006
6018	Lighting	LED - reflector - interior	SF	N/A	NC	85%	29	0.036	15	$3.37	81%	83.1%	76.0%	9.9	0	0	0	0	0	0
6019	Lighting	LED fixtures - interior	SF	N/A	NC	89%	47	0.055	15	$29.44	18%	83.1%	52.7%	8.5	0	0	0	0	0	0
6020	Lighting	LED nightlights	SF	N/A	NC	90%	5	0.005	16	$3.00	61%	100.0%	100.0%	2.0	1	18	1	18	1	18
6021	Lighting	LED - exterior	SF	N/A	NC	52%	23	0.010	15	$3.09	61%	83.1%	69.2%	7.9	0	0	0	0	0	0
6022	Lighting	Linear LED	SF	N/A	NC	44%	10	0.014	9	$2.50	61%	83.1%	69.2%	4.3	3	53	1	44	1	37
6023	Lighting	Residential Occupancy Sensors	SF	N/A	NC	35%	28	0.035	10	$30.00	61%	83.1%	69.2%	1.1	15	291	3	97	3	81
6024	Lighting	Smart Lighting Switch_ET	SF	N/A	NC	35%	29	0.036	10	$25.00	20%	83.1%	53.7%	3.9	15	298	11	396	11	256
6025	Lighting	Exterior Lighting Controls	SF	N/A	NC	35%	65	0.026	10	$30.00	61%	83.1%	69.2%	1.7	10	194	5	161	5	134
6026	Lighting	LED - standard bulb - interior	MF	NLI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0

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															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
6027	Lighting	LED - standard bulb - interior	MF	NLI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0
6028	Lighting	LED - standard bulb - interior	MF	NLI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0
6029	Lighting	LED - standard bulb - interior	MF	LI	DI	70%	18	0.021	15	$8.57	100%	83.1%	83.1%	1.8	0	0	0	0	0	0
6030	Lighting	LED - specialty - interior	MF	NLI	MO	89%	32	0.039	15	$4.00	96%	83.1%	81.4%	7.8	36	324	23	287	22	284
6031	Lighting	LED - specialty - interior	MF	NLI	DI	70%	10	0.012	15	$9.50	100%	83.1%	83.1%	0.9	2	41	0	22	0	18
6032	Lighting	LED - specialty - interior	MF	NLI	DI	70%	10	0.012	15	$9.50	100%	100.0%	100.0%	0.9	2	41	2	31	2	31
6033	Lighting	LED - specialty - interior	MF	LI	DI	70%	10	0.012	15	$9.50	100%	83.1%	83.1%	0.9	10	197	1	111	1	36
6034	Lighting	LED - reflector - interior	MF	NLI	MO	85%	29	0.036	15	$3.37	81%	83.1%	76.0%	9.9	0	0	0	0	0	0
6035	Lighting	LED - reflector - interior	MF	NLI	DI	70%	12	0.018	15	$9.50	100%	83.1%	83.1%	1.2	0	0	0	0	0	0
6036	Lighting	LED - reflector - interior	MF	NLI	DI	70%	12	0.018	15	$9.50	100%	83.1%	83.1%	1.2	0	0	0	0	0	0
6037	Lighting	LED - reflector - interior	MF	LI	DI	70%	12	0.018	15	$9.50	100%	83.1%	83.1%	1.2	0	0	0	0	0	0
6038	Lighting	LED fixtures - interior	MF	N/A	MO	89%	47	0.055	15	$29.44	18%	83.1%	52.7%	8.5	0	0	0	0	0	0
6039	Lighting	LED nightlights	MF	N/A	DI	90%	5	0.005	16	$3.00	61%	100.0%	100.0%	2.0	1	15	1	12	1	12
6040	Lighting	LED - exterior	MF	N/A	MO	52%	23	0.010	15	$3.09	61%	83.1%	69.2%	7.9	0	0	0	0	0	0
6041	Lighting	Linear LED	MF	N/A	MO	44%	10	0.014	9	$2.50	61%	83.1%	69.2%	4.3	2	21	1	17	1	14
6042	Lighting	Residential Occupancy Sensors	MF	N/A	Retrofit	35%	28	0.035	10	$30.00	61%	83.1%	69.2%	1.1	15	148	3	49	3	41
6043	Lighting	Smart Lighting Switch_ET	MF	N/A	Retrofit	35%	29	0.036	10	$25.00	20%	83.1%	53.7%	3.9	15	152	11	201	11	130
6044	Lighting	Exterior Lighting Controls	MF	N/A	Retrofit	35%	65	0.026	10	$30.00	61%	83.1%	69.2%	1.7	13	130	6	108	6	90
6045	Lighting	LED - specialty - interior	MF	N/A	NC	89%	32	0.039	15	$4.00	96%	83.1%	81.4%	7.8	9	181	6	150	6	147
6046	Lighting	LED - reflector - interior	MF	N/A	NC	85%	29	0.036	15	$3.37	81%	83.1%	76.0%	9.9	0	0	0	0	0	0
6047	Lighting	LED fixtures - interior	MF	N/A	NC	89%	47	0.055	15	$29.44	18%	83.1%	52.7%	8.5	0	0	0	0	0	0
6048	Lighting	LED nightlights	MF	N/A	NC	90%	5	0.005	16	$3.00	61%	100.0%	100.0%	2.0	0	1	0	1	0	1
6049	Lighting	LED - exterior	MF	N/A	NC	52%	23	0.010	15	$3.09	61%	83.1%	69.2%	7.9	0	0	0	0	0	0
6050	Lighting	Linear LED	MF	N/A	NC	44%	10	0.014	9	$2.50	61%	83.1%	69.2%	4.3	0	1	0	1	0	0
6051	Lighting	Residential Occupancy Sensors	MF	N/A	NC	35%	28	0.035	10	$30.00	61%	83.1%	69.2%	1.1	0	5	0	2	0	1
6052	Lighting	Smart Lighting Switch_ET	MF	N/A	NC	35%	29	0.036	10	$25.00	20%	83.1%	53.7%	3.9	0	5	0	6	0	4
6053	Lighting	Exterior Lighting Controls	MF	N/A	NC	35%	65	0.026	10	$30.00	61%	83.1%	69.2%	1.7	0	4	0	3	0	3
7001	Miscellaneous	Well Pump	SF	N/A	MO	33%	187	0.021	20	$110.00	61%	82.9%	41.0%	3.0	1,104	22,083	63	12,702	23	4,909
7002	Miscellaneous	Well Pump	SF	N/A	NC	33%	187	0.021	20	$110.00	61%	82.9%	41.0%	3.0	116	2,280	22	1,591	21	828
7003	Miscellaneous	Well Pump	MF	N/A	MO	33%	187	0.021	20	$110.00	61%	82.9%	41.0%	3.0	3	65	0	37	0	14
7004	Miscellaneous	Well Pump	MF	N/A	NC	33%	187	0.021	20	$110.00	61%	82.9%	41.0%	3.0	0	7	0	5	0	2
8001	New Construction	New Construction - Platinum Electric	SF	N/A	NC	26%	2,096	0.239	15	$450.00	100%	82.0%	57.8%	4.7	126	2,478	7	401	6	281
8002	New Construction	New Construction - Gold Electric	SF	N/A	NC	23%	1,863	0.213	15	$400.00	100%	82.0%	57.8%	4.7	112	2,203	12	713	11	499
8003	New Construction	New Construction - Silver Electric	SF	N/A	NC	17%	1,397	0.159	15	$350.00	100%	82.0%	57.8%	4.0	84	1,652	55	3,206	51	2,245
8004	New Construction	New Construction - Platinum Electric	MF	N/A	NC	26%	2,448	0.279	15	$450.00	100%	82.0%	57.8%	5.2	5	90	0	15	0	10
8005	New Construction	New Construction - Gold Electric	MF	N/A	NC	23%	2,176	0.248	15	$400.00	100%	82.0%	57.8%	5.2	4	80	0	26	0	18
8006	New Construction	New Construction - Silver Electric	MF	N/A	NC	17%	1,631	0.186	15	$350.00	100%	82.0%	57.8%	4.5	3	60	2	116	2	81
8007	New Construction	New Construction - Platinum Elec/gas	SF	N/A	NC	26%	2,096	0.239	15	$510.00	100%	82.0%	57.8%	4.2	1,928	41,592	75	6,640	62	4,566
8008	New Construction	New Construction - Gold Elec/gas	SF	N/A	NC	23%	1,863	0.213	15	$450.00	100%	82.0%	57.8%	4.2	1,714	36,969	134	11,803	111	8,118
8009	New Construction	New Construction - Silver Elec/gas	SF	N/A	NC	17%	1,397	0.159	15	$400.00	100%	82.0%	57.8%	3.5	1,285	27,722	603	53,106	499	36,523
8010	New Construction	New Construction - Platinum Elec/gas	MF	N/A	NC	26%	2,448	0.279	15	$510.00	100%	82.0%	57.8%	4.6	215	4,646	8	742	7	510
8011	New Construction	New Construction - Gold Elec/gas	MF	N/A	NC	23%	2,176	0.248	15	$450.00	100%	82.0%	57.8%	4.7	191	4,130	15	1,319	12	907
8012	New Construction	New Construction - Silver Elec/gas	MF	N/A	NC	17%	1,631	0.186	15	$400.00	100%	82.0%	57.8%	3.9	144	3,097	67	5,932	56	4,080
9001	Plug Loads	Smart Power Strips - Tier 1	SF	NLI	Retrofit	12%	23	0.004	4	$16.00	61%	82.9%	41.0%	0.6	2,404	9,569	0	0	0	0
9002	Plug Loads	Smart Power Strips - Tier 1	SF	LI	Retrofit	12%	23	0.004	4	$16.00	100%	82.9%	58.5%	0.3	818	3,258	163	2,702	135	1,907
9003	Plug Loads	Efficient Laptop	SF	N/A	MO	37%	19	0.002	4	$0.01	61%	87.0%	87.0%	710.7	252	1,004	22	87	22	87
9004	Plug Loads	Efficient Monitor	SF	N/A	MO	30%	20	0.002	8	$0.01	61%	82.9%	82.1%	1,498.4	90	717	8	59	7	59
9005	Plug Loads	Efficient Personal Computer	SF	N/A	MO	30%	71	0.008	4	$0.01	61%	82.9%	51.3%	2,738.8	1,348	5,368	77	445	70	275
9006	Plug Loads	Efficient Multifunction	SF	N/A	MO	26%	18	0.002	5	$0.01	61%	99.4%	99.4%	867.6	7	33	1	3	1	3
9007	Plug Loads	Efficient TV	SF	N/A	MO	27%	17	0.002	10	$0.01	61%	82.9%	78.6%	1,576.7	369	3,674	30	305	29	289
9008	Plug Loads	Smart Power Strips - Tier 2	SF	N/A	Retrofit	36%	244	0.056	4	$80.00	19%	82.9%	39.1%	4.2	19,228	76,551	4,784	79,340	4,095	37,379
9009	Plug Loads	Smart Plug	SF	N/A	Retrofit	0%	28	0.003	5	$49.99	61%	82.9%	41.0%	0.3	1,729	8,606	0	0	0	0
9010	Plug Loads	Efficient Laptop	SF	N/A	NC	37%	19	0.002	4	$0.01	61%	82.9%	41.0%	710.7	41	798	1	66	1	33
9011	Plug Loads	Efficient Monitor	SF	N/A	NC	30%	20	0.002	8	$0.01	61%	82.9%	41.0%	1,498.4	21	414	0	34	0	17
9012	Plug Loads	Efficient Personal Computer	SF	N/A	NC	30%	71	0.008	4	$0.01	61%	82.9%	41.0%	2,738.8	58	1,137	1	94	1	47
9013	Plug Loads	Efficient Multifunction	SF	N/A	NC	26%	18	0.002	5	$0.01	61%	82.9%	41.0%	867.6	29	572	1	47	1	23
9014	Plug Loads	Efficient TV	SF	N/A	NC	27%	17	0.002	10	$0.01	61%	82.9%	41.0%	1,576.7	91	1,773	2	147	2	73
9015	Plug Loads	Smart Power Strips - Tier 1	SF	N/A	NC	12%	23	0.004	4	$16.00	61%	82.9%	41.0%	0.6	69	1,358	0	0	0	0
9016	Plug Loads	Smart Power Strips - Tier 2	SF	N/A	NC	36%	244	0.056	4	$80.00	19%	82.9%	39.1%	4.2	415	8,107	103	8,402	88	3,958
9017	Plug Loads	Smart Plug	SF	N/A	NC	0%	28	0.003	5	$49.99	61%	82.9%	41.0%	0.3	47	911	0	0	0	0
9018	Plug Loads	Smart Power Strips - Tier 1	MF	NLI	Retrofit	12%	23	0.004	4	$16.00	61%	82.9%	41.0%	0.6	26	105	0	0	0	0
9019	Plug Loads	Smart Power Strips - Tier 1	MF	LI	Retrofit	12%	23	0.004	4	$16.00	100%	82.9%	58.5%	0.3	32	126	6	104	5	74
9020	Plug Loads	Efficient Laptop	MF	N/A	MO	37%	19	0.002	4	$0.01	61%	87.0%	87.0%	710.7	5	21	0	2	0	2
9021	Plug Loads	Efficient Monitor	MF	N/A	MO	30%	20	0.002	8	$0.01	61%	82.9%	82.1%	1,498.4	1	5	0	0	0	0
9022	Plug Loads	Efficient Personal Computer	MF	N/A	MO	30%	71	0.008	4	$0.01	61%	82.9%	51.3%	2,738.8	13	50	1	4	1	3
9023	Plug Loads	Efficient Multifunction	MF	N/A	MO	26%	18	0.002	5	$0.01	61%	99.4%	99.4%	867.6	0	1	0	0	0	0
9024	Plug Loads	Efficient TV	MF	N/A	MO	27%	17	0.002	10	$0.01	61%	82.9%	78.6%	1,576.7	8	76	1	6	1	6
9025	Plug Loads	Smart Power Strips - Tier 2	MF	N/A	Retrofit	36%	244	0.056	4	$80.00	19%	82.9%	39.1%	4.2	597	2,376	148	2,462	127	1,160
9026	Plug Loads	Smart Plug	MF	N/A	Retrofit	0%	28	0.003	5	$49.99	61%	82.9%	41.0%	0.3	34	170	0	0	0	0
9027	Plug Loads	Efficient Laptop	MF	N/A	NC	37%	19	0.002	4	$0.01	61%	82.9%	41.0%	710.7	1	17	0	1	0	1
9028	Plug Loads	Efficient Monitor	MF	N/A	NC	30%	20	0.002	8	$0.01	61%	82.9%	41.0%	1,498.4	0	3	0	0	0	0

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
9029	Plug Loads	Efficient Personal Computer	MF	N/A	NC	30%	71	0.008	4	$0.01	61%	82.9%	41.0%	2,738.8	1	11	0	1	0	0
9030	Plug Loads	Efficient Multifunction	MF	N/A	NC	26%	18	0.002	5	$0.01	61%	82.9%	41.0%	867.6	1	11	0	1	0	0
9031	Plug Loads	Efficient TV	MF	N/A	NC	27%	17	0.002	10	$0.01	61%	82.9%	41.0%	1,576.7	2	37	0	3	0	2
9032	Plug Loads	Smart Power Strips - Tier 1	MF	N/A	NC	12%	23	0.004	4	$16.00	61%	82.9%	41.0%	0.6	1	24	0	0	0	0
9033	Plug Loads	Smart Power Strips - Tier 2	MF	N/A	NC	36%	244	0.056	4	$80.00	19%	82.9%	39.1%	4.2	13	252	3	261	3	123
9034	Plug Loads	Smart Plug	MF	N/A	NC	0%	28	0.003	5	$49.99	61%	82.9%	41.0%	0.3	1	18	0	0	0	0
10001	Pools	Pool Heater - electric	SF	N/A	MO	80%	996	0.000	15	$1,750.00	61%	82.9%	41.0%	0.6	44	662	0	0	0	0
10002	Pools	Hot Tub/Spa	SF	N/A	MO	39%	417	0.048	15	$40.24	61%	82.9%	41.0%	14.8	583	8,741	275	7,205	225	3,584
10003	Pools	Variable Speed Pool Pump	SF	N/A	MO	39%	220	0.052	10	$314.00	61%	82.9%	41.0%	0.9	814	8,139	0	0	0	0
10004	Pools	Pool Timer	SF	N/A	Retrofit	0%	190	0.045	10	$86.00	61%	82.9%	41.0%	2.8	868	8,675	172	7,186	154	3,552
10005	Pools	Pool Heater - electric	SF	N/A	NC	80%	996	0.000	15	$1,750.00	61%	82.9%	41.0%	0.6	4	84	0	0	0	0
10006	Pools	Hot Tub/Spa	SF	N/A	NC	39%	417	0.048	15	$40.24	61%	82.9%	41.0%	14.8	57	1,113	11	902	10	447
10007	Pools	Variable Speed Pool Pump	SF	N/A	NC	39%	220	0.052	10	$314.00	61%	82.9%	41.0%	0.9	53	1,036	0	0	0	0
10008	Pools	Pool Timer	SF	N/A	NC	0%	190	0.045	10	$86.00	61%	82.9%	41.0%	2.8	46	896	9	742	8	367
11001	Water Heating	Heat Pump Water Heater	SF	NLI	MO	64%	2,251	0.889	10	$1,030.00	61%	82.9%	41.0%	2.5	8,051	44,179	479	47,303	170	23,220
11002	Water Heating	Smart Water Heater - Tank Controls and Sensors	SF	NLI	MO	15%	530	0.209	10	$120.00	61%	82.9%	41.0%	5.0	0	0	0	0	0	0
11003	Water Heating	Solar Water Heater	SF	NLI	MO	50%	1,777	0.702	20	$9,506.00	61%	82.9%	41.0%	0.3	0	0	0	0	0	0
11004	Water Heating	Water Heater Wrap - Electric	SF	NLI	DI	2%	79	0.009	5	$46.59	100%	82.9%	58.5%	0.6	0	0	0	0	0	0
11005	Water Heating	Water Heater Temperature Setback - Electric	SF	NLI	Retrofit	2%	82	0.009	2	$5.00	100%	82.9%	58.5%	2.2	1,284	2,567	254	2,129	210	1,503
11006	Water Heating	Pipe Wrap (HEA) - Electric	SF	NLI	DI	3%	120	0.014	15	$35.10	100%	82.9%	58.5%	3.1	153	3,054	127	1,899	6	994
11007	Water Heating	Low Flow Showerhead 1.5 gpm (HEA) - Electric	SF	NLI	DI	10%	350	0.612	10	$10.00	100%	82.9%	58.5%	19.2	0	0	214	2,136	8	1,288
11008	Water Heating	Low Flow Showerhead 1.5 gpm (Kits) - Electric	SF	NLI	Retrofit	10%	350	0.612	10	$10.00	100%	100.0%	100.0%	19.2	0	0	515	5,152	515	5,152
11009	Water Heating	Low Flow Showerhead 1.5 gpm + T-valve (HEA) - Electric	SF	NLI	DI	11%	394	0.863	10	$35.00	100%	82.9%	58.5%	6.4	823	16,459	202	2,018	7	1,217
11010	Water Heating	Thermostatic Restriction Valve - Electric	SF	NLI	DI	2%	60	0.180	10	$22.50	100%	82.9%	58.5%	1.6	51	1,024	42	424	1	256
11011	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (HEA) - Electric	SF	NLI	DI	5%	182	0.023	10	$8.00	100%	82.9%	58.5%	12.3	129	2,571	107	1,066	5	673
11012	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (Kits) - Electric	SF	NLI	Retrofit	5%	182	0.023	10	$8.00	100%	100.0%	100.0%	12.3	257	2,571	257	2,571	257	2,571
11013	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (HEA) - Electric	SF	NLI	DI	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	53	1,068	44	443	2	279
11014	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (Kits) - Electric	SF	NLI	Retrofit	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	107	1,068	89	886	54	625
11015	Water Heating	Heat Pump Water Heater	SF	LI	MO	64%	2,251	0.889	10	$1,030.00	100%	82.9%	58.5%	1.5	2,741	15,042	122	12,080	45	3,265
11016	Water Heating	Water Heater Wrap - Electric	SF	LI	DI	2%	79	0.009	5	$46.59	100%	100.0%	100.0%	0.6	0	0	5	27	4	12
11017	Water Heating	Water Heater Temperature Setback - Electric	SF	LI	Retrofit	2%	82	0.009	2	$5.00	100%	82.9%	58.5%	2.2	437	874	86	725	52	236
11018	Water Heating	Pipe Wrap (IQW) - Electric	SF	LI	DI	3%	120	0.014	15	$35.10	100%	82.9%	58.5%	3.1	52	1,040	43	647	4	146
11019	Water Heating	Low Flow Showerhead 1.5 gpm (IQW) - Electric	SF	LI	DI	10%	350	0.612	10	$10.00	100%	82.9%	58.5%	19.2	0	0	145	1,454	9	372
11020	Water Heating	Low Flow Showerhead 1.5 gpm + T-valve (IQW) - Electric	SF	LI	DI	11%	394	0.863	10	$35.00	100%	82.9%	58.5%	6.4	280	5,604	69	687	4	176
11021	Water Heating	Thermostatic Restriction Valve - Electric	SF	LI	DI	2%	60	0.180	10	$22.50	100%	82.9%	58.5%	1.6	17	349	14	145	1	37
11022	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (IQW) - Electric	SF	LI	DI	5%	182	0.023	10	$8.00	100%	82.9%	58.5%	12.3	88	1,751	73	726	6	189
11023	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (IQW) - Electric	SF	LI	DI	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	36	727	30	302	1	75
11024	Water Heating	Water Timer - Electric	SF	N/A	Retrofit	9%	301	0.034	15	$60.00	61%	82.9%	41.0%	7.4	1,008	15,126	199	12,086	179	5,994
11025	Water Heating	Shower Timer - Electric	SF	N/A	Retrofit	0%	14	0.505	2	$20.00	61%	82.9%	41.0%	0.5	349	699	0	0	0	0
11026	Water Heating	Drain water Heat Recovery - electric	SF	N/A	Retrofit	25%	884	0.101	20	$742.00	61%	82.9%	41.0%	2.2	211	2,314	43	2,110	39	1,245
11027	Water Heating	Desuperheater	SF	N/A	Retrofit	44%	1,556	0.178	25	$620.00	61%	82.9%	41.0%	5.4	0	0	0	0	0	0
11028	Water Heating	Heat Pump Water Heater	SF	N/A	NC	64%	2,251	0.889	10	$1,030.00	61%	82.9%	41.0%	2.5	142	1,535	29	1,671	26	943
11029	Water Heating	Smart Water Heater - Tank Controls and Sensors	SF	N/A	NC	15%	530	0.209	10	$120.00	61%	82.9%	41.0%	5.0	0	0	0	0	0	0
11030	Water Heating	Solar Water Heater	SF	N/A	NC	50%	1,777	0.702	20	$9,506.00	61%	82.9%	41.0%	0.3	0	0	0	0	0	0
11031	Water Heating	Water Heater Wrap - Electric	SF	N/A	NC	2%	79	0.009	5	$46.59	100%	82.9%	58.5%	0.6	0	0	0	0	0	0
11032	Water Heating	Water Heater Temperature Setback - Electric	SF	N/A	NC	2%	82	0.009	2	$5.00	100%	82.9%	58.5%	2.2	22	426	4	353	4	249
11033	Water Heating	Water Timer - Electric	SF	N/A	NC	9%	301	0.034	15	$60.00	61%	82.9%	41.0%	7.4	80	1,573	16	1,275	14	631
11034	Water Heating	Pipe Wrap (HEA) - Electric	SF	N/A	NC	3%	120	0.014	15	$35.10	100%	82.9%	58.5%	3.1	32	626	26	519	1	298
11035	Water Heating	Low Flow Showerhead 1.5 gpm (HEA) - Electric	SF	N/A	NC	10%	350	0.612	10	$10.00	100%	82.9%	58.5%	19.2	0	0	33	656	1	396
11036	Water Heating	Low Flow Showerhead 1.5 gpm (Kits) - Electric	SF	N/A	NC	10%	350	0.612	10	$10.00	100%	100.0%	100.0%	19.2	0	0	40	791	40	791
11037	Water Heating	Low Flow Showerhead 1.5 gpm + T-valve (HEA) - Electric	SF	N/A	NC	11%	394	0.863	10	$35.00	100%	82.9%	58.5%	6.4	181	3,561	38	738	1	445
11038	Water Heating	Thermostatic Restriction Valve - Electric	SF	N/A	NC	2%	60	0.180	10	$22.50	100%	82.9%	58.5%	1.6	0	0	6	112	0	68
11039	Water Heating	Shower Timer - Electric	SF	N/A	NC	0%	14	0.505	2	$20.00	61%	82.9%	41.0%	0.5	4	73	0	0	0	0
11040	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (HEA) - Electric	SF	N/A	NC	5%	182	0.023	10	$8.00	100%	82.9%	58.5%	12.3	24	476	20	394	1	249
11041	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (Kits) - Electric	SF	N/A	NC	5%	182	0.023	10	$8.00	100%	100.0%	100.0%	12.3	24	476	24	476	24	476
11042	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (HEA) - Electric	SF	N/A	NC	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	10	198	8	164	0	103
11043	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (Kits) - Electric	SF	N/A	NC	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	10	198	8	164	5	116
11044	Water Heating	Drain water Heat Recovery - electric	SF	N/A	NC	25%	884	0.101	20	$742.00	61%	82.9%	41.0%	2.2	224	2,411	45	2,235	41	1,313
11045	Water Heating	Desuperheater	SF	N/A	NC	44%	1,556	0.178	25	$620.00	61%	82.9%	41.0%	5.4	0	0	0	0	0	0
11046	Water Heating	Heat Pump Water Heater	MF	NLI	MO	64%	1,695	0.669	10	$1,030.00	61%	82.9%	41.0%	1.8	260	1,426	15	1,527	5	750
11047	Water Heating	Smart Water Heater - Tank Controls and Sensors	MF	NLI	MO	15%	399	0.158	10	$120.00	61%	82.9%	41.0%	3.7	0	0	0	0	0	0
11048	Water Heating	Water Heater Wrap - Electric	MF	NLI	DI	3%	79	0.009	5	$46.59	100%	82.9%	58.5%	0.6	0	0	0	0	0	0
11049	Water Heating	Water Heater Temperature Setback - Electric	MF	NLI	Retrofit	3%	82	0.009	2	$5.00	100%	82.9%	58.5%	2.2	63	126	12	105	10	74
11050	Water Heating	Pipe Wrap (MFDI) - Electric	MF	NLI	DI	4%	120	0.014	15	$35.10	100%	82.9%	58.5%	3.1	8	169	7	105	5	74
11051	Water Heating	Low Flow Showerhead 1.5 gpm (MFDI) - Electric	MF	NLI	DI	13%	350	0.612	10	$10.00	100%	100.0%	100.0%	19.2	0	0	8	80	8	80
11052	Water Heating	Low Flow Showerhead 1.5 gpm (Kits) - Electric	MF	NLI	Retrofit	13%	350	0.612	10	$10.00	100%	100.0%	100.0%	19.2	0	0	4	40	4	40
11053	Water Heating	Low Flow Showerhead 1.5 gpm + T-valve (MFDI) - Electric	MF	NLI	DI	15%	394	0.863	10	$35.00	100%	100.0%	100.0%	6.4	17	334	3	32	3	32
11054	Water Heating	Thermostatic Restriction Valve - Electric	MF	NLI	DI	2%	60	0.180	10	$22.50	100%	100.0%	100.0%	1.6	4	87	4	43	4	43
11055	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (MFDI) - Electric	MF	NLI	DI	7%	182	0.023	10	$8.00	100%	100.0%	100.0%	12.3	4	82	7	74	7	74
11056	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (Kits) - Electric	MF	NLI	Retrofit	7%	182	0.023	10	$8.00	100%	100.0%	100.0%	12.3	8		2	16	2	16
11057	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (MFDI) - Electric	MF	NLI	DI	1%	34	0.009	10	$6.50	100%	100.0%	100.0%	3.2	1	25	2	22	2	22

Appendix A: Residential Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
11058	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (Kits) - Electric	MF	NLI	Retrofit	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	2	25	0	4	0	3
11059	Water Heating	Heat Pump Water Heater	MF	LI	MO	64%	1,695	0.669	10	$1,030.00	100%	82.9%	58.5%	1.1	313	1,715	14	1,377	5	372
11060	Water Heating	Water Heater Wrap - Electric	MF	LI	DI	3%	79	0.009	5	$46.59	100%	100.0%	100.0%	0.6	0	0	1	7	1	3
11061	Water Heating	Water Heater Temperature Setback - Electric	MF	LI	Retrofit	3%	82	0.009	2	$5.00	100%	82.9%	58.5%	2.2	76	152	15	126	9	41
11062	Water Heating	Pipe Wrap (IQW) - Electric	MF	LI	DI	4%	120	0.014	15	$35.10	100%	82.9%	58.5%	3.1	10	203	8	126	1	29
11063	Water Heating	Low Flow Showerhead 1.5 gpm (IQW) - Electric	MF	LI	DI	13%	350	0.612	10	$10.00	100%	82.9%	58.5%	19.2	0	0	12	120	1	31
11064	Water Heating	Low Flow Showerhead 1.5 gpm + T-valve (IQW) - Electric	MF	LI	DI	15%	394	0.863	10	$35.00	100%	82.9%	58.5%	6.4	20	402	3	32	0	8
11065	Water Heating	Thermostatic Restriction Valve - Electric	MF	LI	DI	2%	60	0.180	10	$22.50	100%	82.9%	58.5%	1.6	5	104	4	43	0	11
11066	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (IQW) - Electric	MF	LI	DI	7%	182	0.023	10	$8.00	100%	82.9%	58.5%	12.3	10	198	8	82	1	21
11067	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (IQW) - Electric	MF	LI	DI	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	3	60	2	25	0	6
11068	Water Heating	Water Timer - Electric	MF	N/A	Retrofit	8%	226	0.026	15	$60.00	61%	82.9%	41.0%	5.6	53	802	11	641	9	318
11069	Water Heating	Shower Timer - Electric	MF	N/A	Retrofit	1%	14	0.505	2	$20.00	61%	82.9%	41.0%	0.5	25	49	0	0	0	0
11070	Water Heating	Drain water Heat Recovery - electric	MF	N/A	Retrofit	25%	666	0.076	20	$742.00	61%	82.9%	41.0%	1.7	11	123	2	112	2	66
11071	Water Heating	Heat Pump Water Heater	MF	N/A	NC	64%	1,695	0.669	10	$1,030.00	61%	82.9%	41.0%	1.8	8	82	2	89	1	50
11072	Water Heating	Smart Water Heater - Tank Controls and Sensors	MF	N/A	NC	15%	399	0.158	10	$120.00	61%	82.9%	41.0%	3.7	0	0	0	0	0	0
11073	Water Heating	Water Heater Wrap - Electric	MF	N/A	NC	3%	79	0.009	5	$46.59	100%	82.9%	58.5%	0.6	0	0	0	0	0	0
11074	Water Heating	Water Heater Temperature Setback - Electric	MF	N/A	NC	3%	82	0.009	2	$5.00	100%	82.9%	58.5%	2.2	2	30	0	25	0	18
11075	Water Heating	Water Timer - Electric	MF	N/A	NC	8%	226	0.026	15	$60.00	61%	82.9%	41.0%	5.6	4	83	1	68	1	33
11076	Water Heating	Pipe Wrap (MFDI) - Electric	MF	N/A	NC	4%	120	0.014	15	$35.10	100%	82.9%	58.5%	3.1	2	44	2	37	1	26
11077	Water Heating	Low Flow Showerhead 1.5 gpm (MFDI) - Electric	MF	N/A	NC	13%	350	0.612	10	$10.00	100%	100.0%	100.0%	19.2	0	0	3	68	3	68
11078	Water Heating	Low Flow Showerhead 1.5 gpm (Kits) - Electric	MF	N/A	NC	13%	350	0.612	10	$10.00	100%	100.0%	100.0%	19.2	0	0	0	10	0	10
11079	Water Heating	Low Flow Showerhead 1.5 gpm + T-valve (MFDI) - Electric	MF	N/A	NC	15%	394	0.863	10	$35.00	100%	100.0%	100.0%	6.4	11	219	4	77	4	77
11080	Water Heating	Thermostatic Restriction Valve - Electric	MF	N/A	NC	2%	60	0.180	10	$22.50	100%	100.0%	100.0%	1.6	0	0	0	8	0	8
11081	Water Heating	Shower Timer - Electric	MF	N/A	NC	1%	14	0.505	2	$20.00	61%	82.9%	41.0%	0.5	0	5	0	0	0	0
11082	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (MFDI) - Electric	MF	N/A	NC	7%	182	0.023	10	$8.00	100%	100.0%	100.0%	12.3	2	34	3	60	3	60
11083	Water Heating	Low Flow Kitchen Aerator 1.5 gpm (Kits) - Electric	MF	N/A	NC	7%	182	0.023	10	$8.00	100%	100.0%	100.0%	12.3	2	34	0	7	0	7
11084	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (MFDI) - Electric	MF	N/A	NC	1%	34	0.009	10	$6.50	100%	100.0%	100.0%	3.2	1	10	1	18	1	18
11085	Water Heating	Low Flow Bathroom Aerator 1.0 gpm (Kits) - Electric	MF	N/A	NC	1%	34	0.009	10	$6.50	100%	82.9%	58.5%	3.2	1	10	0	2	0	1
11086	Water Heating	Drain water Heat Recovery - electric	MF	N/A	NC	25%	666	0.076	20	$742.00	61%	82.9%	41.0%	1.7	12	128	2	119	2	70

Appendix B Residential Natural Gas Efficiency Measure Data

Appendix A: Residential Measure Assumption Detail

															MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
1091	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	MO	12%	0	11	$75.67	36%	82.9%	77.6%	0.5	495	5,447	0	0	0	0
1092	Appliance	Smart Dishwasher (NG WH)	SF	N/A	MO	15%	0	11	$395.00	36%	82.9%	77.6%	0.1	609	6,697	0	0	0	0
1093	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	8%	0	14	$84.00	51%	82.9%	67.1%	2.2	49	684	35	567	33	459
1094	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	78%	0	14	$141.00	51%	82.9%	67.1%	1.5	503	7,041	357	5,838	337	4,725
1095	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	19%	0	14	$84.00	36%	82.9%	67.1%	0.9	747	10,457	0	0	0	0
1096	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	46%	1	14	$141.00	36%	82.9%	67.1%	0.5	1,845	25,827	0	0	0	0
1097	Appliance	Dryer Vent Cleaning (NG)	SF	N/A	Retrofit	6%	0	1	$80.00	86%	82.9%	51.9%	0.0	13,272	12,545	0	0	0	0
1098	Appliance	ENERGY STAR Clothes Dryer (NG)	SF	N/A	MO	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	2,532	38,287	0	0	0	0
1099	Appliance	Smart Clothes Dryer (NG)	SF	N/A	MO	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	3,199	48,379	0	0	0	0
1100	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	NC	12%	0	11	$75.67	36%	82.9%	30.1%	0.5	94	2,035	0	0	0	0
1101	Appliance	Smart Dishwasher (NG WH)	SF	N/A	NC	15%	0	11	$395.00	36%	82.9%	30.1%	0.1	116	2,503	0	0	0	0
1102	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	8%	0	14	$84.00	51%	82.9%	37.0%	2.2	11	235	2	192	2	86
1103	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	78%	0	14	$141.00	51%	82.9%	37.0%	1.5	112	2,423	22	1,977	18	883
1104	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	19%	0	14	$84.00	36%	82.9%	30.1%	0.9	167	3,599	0	0	0	0
1105	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	46%	1	14	$141.00	36%	82.9%	30.1%	0.5	412	8,888	0	0	0	0
1106	Appliance	ENERGY STAR Clothes Dryer (NG)	SF	N/A	NC	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	442	9,009	0	0	0	0
1107	Appliance	Smart Clothes Dryer (NG)	SF	N/A	NC	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	558	11,384	0	0	0	0
1108	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	MO	12%	0	11	$75.67	36%	82.9%	77.6%	0.5	17	183	0	0	0	0
1109	Appliance	Smart Dishwasher (NG WH)	MF	N/A	MO	15%	0	11	$395.00	36%	82.9%	77.6%	0.1	21	226	0	0	0	0
1110	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	8%	0	14	$84.00	51%	82.9%	67.1%	2.2	3	37	2	30	2	25
1111	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	78%	0	14	$141.00	51%	82.9%	67.1%	1.5	27	378	19	313	18	253
1112	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	19%	0	14	$84.00	36%	82.9%	67.1%	0.9	12	173	0	0	0	0
1113	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	46%	1	14	$141.00	36%	82.9%	67.1%	0.5	31	428	0	0	0	0
1114	Appliance	Dryer Vent Cleaning (NG)	MF	N/A	Retrofit	6%	0	1	$80.00	100%	82.9%	58.5%	0.0	304	288	0	0	0	0
1115	Appliance	ENERGY STAR Clothes Dryer (NG)	MF	N/A	MO	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	58	878	0	0	0	0
1116	Appliance	Smart Clothes Dryer (NG)	MF	N/A	MO	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	73	1,110	0	0	0	0
1117	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	NC	12%	0	11	$75.67	36%	82.9%	30.1%	0.5	7	147	0	0	0	0
1118	Appliance	Smart Dishwasher (NG WH)	MF	N/A	NC	15%	0	11	$395.00	36%	82.9%	30.1%	0.1	8	181	0	0	0	0
1119	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	8%	0	14	$84.00	51%	82.9%	37.0%	2.2	1	27	0	22	0	10
1120	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	78%	0	14	$141.00	51%	82.9%	37.0%	1.5	13	279	3	228	2	102
1121	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	19%	0	14	$84.00	36%	82.9%	30.1%	0.9	6	128	0	0	0	0
1122	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	46%	1	14	$141.00	36%	82.9%	30.1%	0.5	15	316	0	0	0	0
1123	Appliance	ENERGY STAR Clothes Dryer (NG)	MF	N/A	NC	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	22	444	0	0	0	0
1124	Appliance	Smart Clothes Dryer (NG)	MF	N/A	NC	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	28	562	0	0	0	0
1125	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	MO	12%	0	11	$75.67	36%	82.9%	77.6%	0.5	555	6,101	0	0	0	0
1126	Appliance	Smart Dishwasher (NG WH)	SF	N/A	MO	15%	0	11	$395.00	36%	82.9%	77.6%	0.1	682	7,500	0	0	0	0
1127	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	8%	0	14	$84.00	51%	82.9%	67.1%	2.2	55	766	39	635	37	514
1128	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	78%	0	14	$141.00	51%	82.9%	67.1%	1.5	563	7,883	399	6,536	378	5,289
1129	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	19%	0	14	$84.00	36%	82.9%	67.1%	0.9	837	11,714	0	0	0	0
1130	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	46%	1	14	$141.00	36%	82.9%	67.1%	0.5	2,067	28,931	0	0	0	0
1131	Appliance	Dryer Vent Cleaning (NG)	SF	N/A	Retrofit	6%	0	1	$80.00	86%	82.9%	51.9%	0.0	15,064	14,239	0	0	0	0
1132	Appliance	ENERGY STAR Clothes Dryer (NG)	SF	N/A	MO	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	2,874	43,458	0	0	0	0
1133	Appliance	Smart Clothes Dryer (NG)	SF	N/A	MO	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	3,631	54,913	0	0	0	0
1134	Appliance	ENERGY STAR Dishwasher (NG WH)	SF	N/A	NC	12%	0	11	$75.67	36%	82.9%	30.1%	0.5	106	2,280	0	0	0	0
1135	Appliance	Smart Dishwasher (NG WH)	SF	N/A	NC	15%	0	11	$395.00	36%	82.9%	30.1%	0.1	130	2,803	0	0	0	0
1136	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	8%	0	14	$84.00	51%	82.9%	37.0%	2.2	12	264	2	215	2	96
1137	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	78%	0	14	$141.00	51%	82.9%	37.0%	1.5	126	2,713	25	2,214	20	989
1138	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	19%	0	14	$84.00	36%	82.9%	30.1%	0.9	187	4,031	0	0	0	0
1139	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	46%	1	14	$141.00	36%	82.9%	30.1%	0.5	461	9,956	0	0	0	0
1140	Appliance	ENERGY STAR Clothes Dryer (NG)	SF	N/A	NC	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	501	10,226	0	0	0	0
1141	Appliance	Smart Clothes Dryer (NG)	SF	N/A	NC	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	634	12,921	0	0	0	0
1142	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	MO	12%	0	11	$75.67	36%	82.9%	77.6%	0.5	27	301	0	0	0	0
1143	Appliance	Smart Dishwasher (NG WH)	MF	N/A	MO	15%	0	11	$395.00	36%	82.9%	77.6%	0.1	34	370	0	0	0	0
1144	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	8%	0	14	$84.00	51%	82.9%	67.1%	2.2	4	60	3	50	3	40
1145	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	78%	0	14	$141.00	51%	82.9%	67.1%	1.5	44	620	31	514	30	416
1146	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	19%	0	14	$84.00	36%	82.9%	67.1%	0.9	20	284	0	0	0	0
1147	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	46%	1	14	$141.00	36%	82.9%	67.1%	0.5	50	701	0	0	0	0
1148	Appliance	Dryer Vent Cleaning (NG)	MF	N/A	Retrofit	6%	0	1	$80.00	100%	82.9%	58.5%	0.0	453	428	0	0	0	0
1149	Appliance	ENERGY STAR Clothes Dryer (NG)	MF	N/A	MO	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	86	1,307	0	0	0	0
1150	Appliance	Smart Clothes Dryer (NG)	MF	N/A	MO	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	109	1,651	0	0	0	0
1151	Appliance	ENERGY STAR Dishwasher (NG WH)	MF	N/A	NC	12%	0	11	$75.67	36%	82.9%	30.1%	0.5	5	112	0	0	0	0
1152	Appliance	Smart Dishwasher (NG WH)	MF	N/A	NC	15%	0	11	$395.00	36%	82.9%	30.1%	0.1	6	138	0	0	0	0
1153	Appliance	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	8%	0	14	$84.00	51%	82.9%	37.0%	2.2	1	21	0	17	0	8
1154	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	78%	0	14	$141.00	51%	82.9%	37.0%	1.5	10	213	2	174	2	78
1155	Appliance	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	19%	0	14	$84.00	36%	82.9%	30.1%	0.9	5	98	0	0	0	0
1156	Appliance	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	46%	1	14	$141.00	36%	82.9%	30.1%	0.5	11	241	0	0	0	0
1157	Appliance	ENERGY STAR Clothes Dryer (NG)	MF	N/A	NC	21%	0	16	$152.00	36%	82.9%	30.1%	0.7	15	307	0	0	0	0
1158	Appliance	Smart Clothes Dryer (NG)	MF	N/A	NC	26%	1	16	$986.00	6%	82.9%	17.1%	0.9	19	388	0	0	0	0

Appendix A: Residential Measure Assumption Detail

														MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
2006	Audit	Audit Recommendations (elec/gas) - Single-family	SF	NLI	DI	0%	0	1	$55.00	100%	82.0%	57.8%	0.1	3,507	70,150	199	2,875	253	2,029
2007	Audit	Audit Recommendations (elec/gas) - Single-family	SF	LI	DI	0%	0	1	$55.00	100%	82.0%	57.8%	0.1	1,232	24,647	239	1,010	182	339
2008	Audit	Audit Recommendations (elec/gas) - Multifamily	MF	NLI	DI	1%	0	1	$55.00	100%	82.0%	57.8%	0.1	94	1,879	5	77	7	54
2009	Audit	Audit Recommendations (elec/gas) - Multifamily	MF	NLI	DI	1%	0	1	$55.00	100%	82.0%	57.8%	0.1	0	0	8	77	9	54
2010	Audit	Audit Recommendations (elec/gas) - Multifamily	MF	LI	DI	1%	0	1	$55.00	100%	82.0%	57.8%	0.1	117	2,339	23	96	17	32
2011	Audit	Audit Recommendations (gas) - Single-family	SF	NLI	DI	0%	0	1	$55.00	100%	82.0%	57.8%	0.1	4,013	80,271	228	3,289	116	2,322
2012	Audit	Audit Recommendations (gas) - Single-family	SF	LI	DI	0%	0	1	$55.00	100%	82.0%	57.8%	0.1	1,367	27,331	78	1,120	28	376
2013	Audit	Audit Recommendations (gas) - Multifamily	MF	NLI	DI	1%	0	1	$55.00	100%	82.0%	57.8%	0.1	137	2,742	8	112	4	79
2014	Audit	Audit Recommendations (gas) - Multifamily	MF	NLI	DI	1%	0	1	$55.00	100%	82.0%	57.8%	0.1	0	0	12	112	13	79
2015	Audit	Audit Recommendations (gas) - Multifamily	MF	LI	DI	1%	0	1	$55.00	100%	82.0%	57.8%	0.1	177	3,532	10	145	4	49
3013	Behavioral	Home Energy Reports	SF	N/A	Retrofit	0%	0	1	$0.00	100%	100.0%	100.0%	#########	95,925	95,925	53,112	95,925	49,703	95,925
3014	Behavioral	Home Energy Management System	SF	N/A	Retrofit	0%	0	5	$90.00	61%	100.0%	100.0%	1.6	0	0	0	0	0	0
3015	Behavioral	Pre-pay	SF	N/A	Retrofit	0%	0	3	$40.00	61%	100.0%	100.0%	3.5	0	0	0	0	0	0
3016	Behavioral	Home Energy Reports	SF	N/A	NC	0%	0	1	$0.00	100%	100.0%	100.0%	#########	609	13,132	337	13,132	315	13,132
3017	Behavioral	Home Energy Management System	SF	N/A	NC	0%	0	5	$90.00	61%	100.0%	100.0%	0.9	0	0	0	0	0	0
3018	Behavioral	Pre-pay	SF	N/A	NC	0%	0	3	$40.00	61%	100.0%	100.0%	2.0	0	0	0	0	0	0
3019	Behavioral	Home Energy Reports	MF	N/A	Retrofit	0%	0	1	$0.00	100%	100.0%	100.0%	#########	3,484	3,484	1,929	3,484	1,805	3,484
3020	Behavioral	Home Energy Management System	MF	N/A	Retrofit	0%	0	5	$90.00	61%	100.0%	100.0%	1.9	0	0	0	0	0	0
3021	Behavioral	Pre-pay	MF	N/A	Retrofit	0%	0	3	$40.00	61%	100.0%	100.0%	4.1	0	0	0	0	0	0
3022	Behavioral	Home Energy Reports	MF	N/A	NC	0%	0	1	$0.00	100%	100.0%	100.0%	#########	35	754	19	754	18	754
3023	Behavioral	Home Energy Management System	MF	N/A	NC	0%	0	5	$90.00	61%	100.0%	100.0%	0.6	0	0	0	0	0	0
3024	Behavioral	Pre-pay	MF	N/A	NC	0%	0	3	$40.00	61%	100.0%	100.0%	1.2	0	0	0	0	0	0
3025	Behavioral	Home Energy Reports	SF	N/A	Retrofit	0%	0	1	$0.00	100%	100.0%	100.0%	#########	108,881	108,881	60,285	108,881	65,686	108,881
3026	Behavioral	Home Energy Management System	SF	N/A	Retrofit	0%	0	5	$90.00	61%	100.0%	100.0%	1.6	0	0	0	0	0	0
3027	Behavioral	Pre-pay	SF	N/A	Retrofit	0%	0	3	$40.00	61%	100.0%	100.0%	3.5	0	0	0	0	0	0
3028	Behavioral	Home Energy Reports	SF	N/A	NC	0%	0	1	$0.00	100%	100.0%	100.0%	#########	691	14,905	383	14,905	417	14,905
3029	Behavioral	Home Energy Management System	SF	N/A	NC	0%	0	5	$90.00	61%	100.0%	100.0%	0.9	0	0	0	0	0	0
3030	Behavioral	Pre-pay	SF	N/A	NC	0%	0	3	$40.00	61%	100.0%	100.0%	2.0	0	0	0	0	0	0
3031	Behavioral	Home Energy Reports	MF	N/A	Retrofit	0%	0	1	$0.00	100%	100.0%	100.0%	#########	5,182	5,182	2,869	5,182	3,126	5,182
3032	Behavioral	Home Energy Management System	MF	N/A	Retrofit	0%	0	5	$90.00	61%	100.0%	100.0%	1.9	0	0	0	0	0	0
3033	Behavioral	Pre-pay	MF	N/A	Retrofit	0%	0	3	$40.00	61%	100.0%	100.0%	4.1	0	0	0	0	0	0
3034	Behavioral	Home Energy Reports	MF	N/A	NC	0%	0	1	$0.00	100%	100.0%	100.0%	#########	24	521	13	521	15	521
3035	Behavioral	Home Energy Management System	MF	N/A	NC	0%	0	5	$90.00	61%	100.0%	100.0%	0.6	0	0	0	0	0	0
3036	Behavioral	Pre-pay	MF	N/A	NC	0%	0	3	$40.00	61%	100.0%	100.0%	1.2	0	0	0	0	0	0
4236	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	NLI	MO	19%	14	15	$1,536.15	16%	82.1%	39.9%	2.8	72,962	1,042,079	13,697	345,792	11,696	172,781
4237	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	NLI	MO	19%	14	15	$1,438.00	14%	82.1%	39.9%	2.2	72,962	1,042,079	54,789	1,383,168	46,782	691,124
4238	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	SF	NLI	MO	75%	55	18	$2,011.00	36%	82.1%	51.2%	2.3	0	0	0	0	0	0
4239	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	SF	NLI	MO	75%	55	18	$1,907.00	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4240	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	SF	NLI	MO	75%	55	18	$3,196.00	36%	82.1%	51.2%	2.1	0	0	0	0	0	0
4241	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	SF	NLI	MO	75%	55	18	$3,092.00	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4242	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	SF	NLI	Retrofit	13%	9	15	$250.00	26%	82.1%	24.3%	13.5	67,534	1,013,039	3,887	729,524	2,723	214,203
4243	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	NLI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	56.3	3,725	74,493	214	38,861	108	21,861
4244	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	NLI	Retrofit	2%	1	14	$5.00	100%	100.0%	100.0%	56.3	5,321	74,493	5,329	74,493	5,328	74,493
4245	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	LI	MO	19%	14	15	$1,536.15	16%	82.1%	51.2%	2.8	25,635	366,136	14,434	304,799	13,187	194,813
4246	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	LI	MO	19%	14	15	$1,438.00	14%	82.1%	51.2%	2.2	25,635	366,136	14,434	304,799	13,187	194,813
4247	HVAC Equipment	Programmable Thermostat - gas furnace / CAC baseline	SF	LI	DI	7%	5	15	$60.00	100%	82.1%	58.0%	4.5	9,681	193,627	557	104,578	202	21,815
4248	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	LI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	56.3	2,617	52,346	151	27,308	55	5,776
4249	HVAC Equipment	Furnace Tune Up	SF	N/A	Retrofit	5%	4	5	$175.00	51%	82.1%	34.9%	0.6	108,434	516,234	0	0	0	0
4250	HVAC Equipment	Furnace Fan - gas furnace / CAC baseline	SF	N/A	Retrofit	0%	0	20	$98.65	36%	82.1%	28.1%	52.2	0	0	0	0	0	0
4251	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	SF	N/A	Retrofit	10%	7	15	$1,200.00	17%	82.1%	19.9%	4.8	104,688	1,318,121	20,768	1,107,963	15,995	297,565
4252	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	N/A	NC	19%	14	15	$1,536.15	16%	82.1%	39.9%	2.8	5,268	108,208	989	35,970	844	17,941
4253	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	N/A	NC	19%	14	15	$1,438.00	14%	82.1%	39.9%	2.2	5,268	108,208	3,956	143,878	3,378	71,765
4254	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	SF	N/A	NC	75%	55	18	$2,011.00	36%	82.1%	28.1%	2.3	0	0	0	0	0	0
4255	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	SF	N/A	NC	75%	55	18	$1,907.00	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4256	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	SF	N/A	NC	75%	55	18	$3,196.00	36%	82.1%	28.1%	2.1	0	0	0	0	0	0
4257	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	SF	N/A	NC	75%	55	18	$3,092.00	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4258	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	SF	N/A	NC	10%	7	15	$250.00	26%	82.1%	24.3%	12.6	5,639	121,662	325	91,024	227	26,768
4259	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	SF	N/A	NC	10%	7	15	$1,200.00	17%	82.1%	19.9%	4.8	16,645	301,425	3,302	256,083	2,543	68,108
4260	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	NLI	MO	19%	11	15	$1,056.82	24%	82.1%	39.9%	2.5	1,174	16,768	220	5,564	188	2,780
4261	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	NLI	MO	19%	11	15	$958.67	21%	82.1%	39.9%	1.8	1,174	16,768	882	22,257	753	11,121
4262	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	MF	NLI	MO	75%	45	18	$1,340.67	36%	82.1%	51.2%	2.2	0	0	0	0	0	0
4263	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	MF	NLI	MO	75%	45	18	$1,243.33	36%	82.1%	51.2%	1.5	0	0	0	0	0	0
4264	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	MF	NLI	MO	75%	45	18	$2,137.33	36%	82.1%	51.2%	2.1	0	0	0	0	0	0
4265	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	MF	NLI	MO	75%	45	18	$2,033.33	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4266	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	NLI	Retrofit	13%	7	15	$250.00	26%	82.1%	24.3%	10.0	691	10,361	40	7,462	28	2,191
4267	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	NLI	DI	13%	7	15	$250.00	26%	100.0%	100.0%	10.0	518	10,361	519	7,771	519	7,771
4268	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	NLI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	40.6	60	1,199	3	625	2	352
4269	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	NLI	Retrofit	2%	1	14	$5.00	100%	100.0%	100.0%	40.6	86	1,199	86	1,199	86	1,199

Appendix A: Residential Measure Assumption Detail

															MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
4270	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	LI	MO	19%	11	15	$1,056.82	24%	82.1%	51.2%	2.5	1,461	20,871	823	17,375	752	11,105
4271	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	LI	MO	19%	11	15	$958.67	21%	82.1%	51.2%	1.8	1,461	20,871	823	17,375	752	11,105
4272	HVAC Equipment	Programmable Thermostat - gas furnace / CAC baseline	MF	LI	DI	7%	4	15	$60.00	100%	82.1%	58.0%	3.3	702	14,031	40	7,578	15	1,581
4273	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	LI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	40.6	149	2,984	9	1,557	3	329
4274	HVAC Equipment	Furnace Tune Up	MF	N/A	Retrofit	5%	3	5	$175.00	51%	82.1%	34.9%	0.5	2,898	13,798	0	0	0	0
4275	HVAC Equipment	Furnace Fan - gas furnace / CAC baseline	MF	N/A	Retrofit	0%	0	20	$98.65	36%	82.1%	28.1%	56.4	0	0	0	0	0	0
4276	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	MF	N/A	Retrofit	10%	6	15	$720.00	17%	82.1%	20.2%	5.6	2,798	35,231	555	29,614	392	8,046
4277	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	N/A	NC	19%	11	15	$1,056.82	24%	82.1%	39.9%	2.5	303	6,219	57	2,067	49	1,031
4278	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	N/A	NC	19%	11	15	$958.67	21%	82.1%	39.9%	1.8	303	6,219	227	8,268	194	4,124
4279	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	MF	N/A	NC	75%	45	18	$1,347.33	36%	82.1%	28.1%	2.2	0	0	0	0	0	0
4280	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	MF	N/A	NC	75%	45	18	$1,243.33	36%	82.1%	28.1%	1.5	0	0	0	0	0	0
4281	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	MF	N/A	NC	75%	45	18	$2,137.33	36%	82.1%	28.1%	2.1	0	0	0	0	0	0
4282	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	MF	N/A	NC	75%	45	18	$2,033.33	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4283	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	N/A	NC	10%	6	15	$250.00	26%	82.1%	24.3%	9.2	324	6,992	19	5,231	13	1,538
4284	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	MF	N/A	NC	10%	6	15	$720.00	17%	82.1%	20.2%	5.6	957	17,322	190	14,717	134	3,964
4285	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	NLI	MO	19%	14	15	$1,536.15	16%	82.1%	39.9%	2.8	83,488	1,192,418	15,673	395,679	13,383	197,708
4286	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	NLI	MO	19%	14	15	$1,438.00	14%	82.1%	39.9%	2.2	83,488	1,192,418	62,693	1,582,715	53,531	790,831
4287	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	SF	NLI	MO	75%	55	18	$2,011.00	36%	82.1%	51.2%	2.3	0	0	0	0	0	0
4288	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	SF	NLI	MO	75%	55	18	$1,907.00	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4289	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	SF	NLI	MO	75%	55	18	$3,196.00	36%	82.1%	51.2%	2.1	0	0	0	0	0	0
4290	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	SF	NLI	MO	75%	55	18	$3,092.00	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4291	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	SF	NLI	Retrofit	13%	9	15	$250.00	26%	82.1%	24.3%	13.5	77,277	1,159,189	4,448	834,771	2,342	234,466
4292	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	NLI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	56.3	4,262	85,240	245	44,467	123	25,015
4293	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	NLI	Retrofit	2%	1	14	$5.00	100%	100.0%	100.0%	56.3	6,088	85,240	6,097	85,240	6,097	85,240
4294	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	LI	MO	19%	14	15	$1,536.15	16%	82.1%	51.2%	2.8	28,426	405,998	16,005	337,983	14,623	216,023
4295	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	LI	MO	19%	14	15	$1,438.00	14%	82.1%	51.2%	2.2	28,426	405,998	16,005	337,983	14,623	216,023
4296	HVAC Equipment	Programmable Thermostat - gas furnace / CAC baseline	SF	LI	DI	7%	5	15	$60.00	100%	82.1%	58.0%	4.5	10,735	214,708	953	120,822	746	29,880
4297	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	SF	LI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	56.3	2,902	58,045	167	30,281	61	6,405
4298	HVAC Equipment	Furnace Tune Up	SF	N/A	Retrofit	5%	4	5	$175.00	51%	82.1%	34.9%	0.6	123,080	585,960	0	0	0	0
4299	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	SF	N/A	Retrofit	10%	7	15	$1,200.00	17%	82.1%	19.9%	4.8	118,827	1,496,154	23,573	1,257,610	18,155	337,756
4300	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	SF	N/A	NC	19%	14	15	$1,536.15	16%	82.1%	39.9%	2.8	5,979	122,823	1,122	40,828	958	20,365
4301	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	SF	N/A	NC	19%	14	15	$1,438.00	14%	82.1%	39.9%	2.2	5,979	122,823	4,490	163,311	3,834	81,458
4302	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	SF	N/A	NC	75%	55	18	$2,011.00	36%	82.1%	28.1%	2.3	0	0	0	0	0	0
4303	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	SF	N/A	NC	75%	55	18	$1,907.00	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4304	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	SF	N/A	NC	75%	55	18	$3,196.00	36%	82.1%	28.1%	2.1	0	0	0	0	0	0
4305	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	SF	N/A	NC	75%	55	18	$3,092.00	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4306	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	SF	N/A	NC	10%	7	15	$250.00	26%	82.1%	24.3%	12.6	6,401	138,094	368	103,318	194	29,428
4307	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	SF	N/A	NC	10%	7	15	$1,200.00	17%	82.1%	19.9%	4.8	18,893	342,137	3,748	290,672	2,887	77,307
4308	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	NLI	MO	19%	11	15	$1,056.82	24%	82.1%	39.9%	2.5	1,713	24,466	322	8,119	275	4,057
4309	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	NLI	MO	19%	11	15	$958.67	21%	82.1%	39.9%	1.8	1,713	24,466	1,286	32,474	1,098	16,226
4310	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	MF	NLI	MO	75%	45	18	$1,347.33	36%	82.1%	51.2%	2.2	0	0	0	0	0	0
4311	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	MF	NLI	MO	75%	45	18	$1,243.33	36%	82.1%	51.2%	1.5	0	0	0	0	0	0
4312	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	MF	NLI	MO	75%	45	18	$2,137.33	36%	82.1%	51.2%	2.1	0	0	0	0	0	0
4313	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	MF	NLI	MO	75%	45	18	$2,033.33	36%	82.1%	51.2%	1.6	0	0	0	0	0	0
4314	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	NLI	Retrofit	13%	7	15	$250.00	26%	82.1%	24.3%	10.0	1,008	15,118	58	10,887	31	3,058
4315	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	NLI	DI	13%	7	15	$250.00	26%	100.0%	100.0%	10.0	756	15,118	757	11,338	757	11,338
4316	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	NLI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	40.6	87	1,749	5	912	3	513
4317	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	NLI	Retrofit	2%	1	14	$5.00	100%	100.0%	100.0%	40.6	125	1,749	125	1,749	125	1,749
4318	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	LI	MO	19%	11	15	$1,056.82	24%	82.1%	51.2%	2.5	2,207	31,520	1,243	26,240	1,135	16,771
4319	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	LI	MO	19%	11	15	$958.67	21%	82.1%	51.2%	1.8	2,207	31,520	1,243	26,240	1,135	16,771
4320	HVAC Equipment	Programmable Thermostat - gas furnace / CAC baseline	MF	LI	DI	7%	4	15	$60.00	100%	82.1%	58.0%	3.3	1,060	21,191	94	11,925	74	2,949
4321	HVAC Equipment	Filter Whistle - gas furnace / CAC baseline	MF	LI	DI	2%	1	14	$5.00	100%	82.1%	58.0%	40.6	225	4,506	13	2,351	5	497
4322	HVAC Equipment	Furnace Tune Up	MF	N/A	Retrofit	5%	3	5	$175.00	51%	82.1%	34.9%	0.5	4,311	20,524	0	0	0	0
4323	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	MF	N/A	Retrofit	10%	6	15	$720.00	17%	82.1%	20.2%	5.6	4,162	52,404	826	44,049	584	11,967
4324	HVAC Equipment	Natural Gas Furnace (95 AFUE) with ECM	MF	N/A	NC	19%	11	15	$1,056.82	24%	82.1%	39.9%	2.5	209	4,302	39	1,430	34	713
4325	HVAC Equipment	Natural Gas Furnace (95 AFUE) without ECM	MF	N/A	NC	19%	11	15	$958.67	21%	82.1%	39.9%	1.8	209	4,302	157	5,720	134	2,853
4326	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/13 gas baseline)	MF	N/A	NC	75%	45	18	$1,347.33	36%	82.1%	28.1%	2.2	0	0	0	0	0	0
4327	HVAC Equipment	ENERGY STAR DFHP (18 SEER / 9.5 hspf) - (80/14 gas baseline)	MF	N/A	NC	75%	45	18	$1,243.33	36%	82.1%	28.1%	1.5	0	0	0	0	0	0
4328	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/13 gas baseline)	MF	N/A	NC	75%	45	18	$2,137.33	36%	82.1%	28.1%	2.1	0	0	0	0	0	0
4329	HVAC Equipment	ENERGY STAR DFHP (20 SEER / 10.0 hspf) - (80/14 gas baseline)	MF	N/A	NC	75%	45	18	$2,033.33	36%	82.1%	28.1%	1.6	0	0	0	0	0	0
4330	HVAC Equipment	Smart Thermostat - gas furnace / CAC baseline	MF	N/A	NC	10%	6	15	$250.00	26%	82.1%	24.3%	9.2	224	4,837	13	3,619	7	1,031
4331	HVAC Equipment	Smart Vents/Sensors - gas furnace / CAC baseline	MF	N/A	NC	10%	6	15	$720.00	17%	82.1%	20.2%	5.6	662	11,984	131	10,181	93	2,742
4332	HVAC Equipment	Natural Gas Boiler (90 AFUE)	SF	NLI	MO	10%	8	15	$1,272.00	14%	82.1%	77.3%	1.4	4,367	62,378	3,415	52,058	3,392	50,111
4333	HVAC Equipment	Natural Gas Boiler (92 AFUE)	SF	NLI	MO	12%	10	15	$1,477.00	14%	82.1%	77.3%	1.5	5,459	77,973	4,269	65,073	4,240	62,639
4334	HVAC Equipment	Natural Gas Boiler (90 AFUE)	SF	LI	MO	10%	8	15	$1,272.00	14%	82.1%	42.9%	1.4	1,583	22,606	743	18,753	682	10,071
4335	HVAC Equipment	Natural Gas Boiler (92 AFUE)	SF	LI	MO	12%	10	15	$1,477.00	14%	82.1%	42.9%	1.5	1,978	28,257	929	23,441	852	12,589
4336	HVAC Equipment	Boiler Tune Up	SF	N/A	Retrofit	5%	4	5	$140.00	50%	82.1%	34.4%	0.7	11,910	56,700	0	0	0	0
4337	HVAC Equipment	Natural Gas Boiler (90 AFUE)	MF	NLI	MO	10%	6	15	$848.00	21%	82.1%	21.7%	1.0	185	2,641	16	2,014	17	577

Appendix A: Residential Measure Assumption Detail

														MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
4338	HVAC Equipment	Natural Gas Boiler (92 AFUE)	MF	NLI	MO	12%	7	15	$984.67	20%	82.1%	21.6%	1.1	231	3,301	21	2,518	22	716
4339	HVAC Equipment	Natural Gas Boiler (90 AFUE)	MF	LI	MO	10%	6	15	$848.00	21%	82.1%	42.9%	1.0	238	3,403	112	2,823	103	1,516
4340	HVAC Equipment	Natural Gas Boiler (92 AFUE)	MF	LI	MO	12%	7	15	$984.67	20%	82.1%	42.9%	1.1	298	4,253	140	3,528	128	1,895
4341	HVAC Equipment	Boiler Tune Up	MF	N/A	Retrofit	5%	3	5	$140.00	50%	82.1%	34.4%	0.5	847	4,032	0	0	0	0
4342	HVAC Equipment	Natural Gas Boiler (90 AFUE)	SF	N/A	NC	10%	8	15	$1,272.00	14%	82.1%	18.7%	1.4	301	6,184	27	4,840	24	1,172
4343	HVAC Equipment	Natural Gas Boiler (92 AFUE)	SF	N/A	NC	12%	10	15	$1,477.00	14%	82.1%	18.6%	1.5	376	7,730	34	6,050	30	1,458
4344	HVAC Equipment	Natural Gas Boiler (90 AFUE)	MF	N/A	NC	10%	6	15	$848.00	21%	82.1%	21.7%	1.0	21	440	2	344	2	97
4345	HVAC Equipment	Natural Gas Boiler (92 AFUE)	MF	N/A	NC	12%	7	15	$984.67	20%	82.1%	21.6%	1.1	27	550	2	430	3	120
5067	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	SF	NLI	DI	33%	35	25	$1,528.30	46%	82.0%	26.6%	5.2	46,275	729,289	2,700	453,134	1,559	158,541
5068	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	SF	NLI	DI	15%	13	25	$1,168.70	60%	82.0%	34.0%	2.4	32,123	506,249	1,874	314,552	1,028	131,354
5069	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	SF	NLI	DI	10%	8	25	$988.90	71%	82.0%	40.4%	1.6	31,827	501,588	1,857	311,655	892	143,475
5070	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	SF	NLI	DI	2%	1	20	$268.00	56%	82.0%	31.9%	1.2	6,942	109,408	942	76,783	794	35,299
5071	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	SF	NLI	Retrofit	20%	14	15	$576.60	61%	82.0%	34.6%	3.2	54,630	645,724	4,914	521,132	5,376	249,030
5072	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	SF	NLI	Retrofit	34%	37	25	$2,696.40	61%	82.0%	34.6%	2.0	68,858	1,085,194	6,194	718,841	6,776	363,121
5073	HVAC Shell	Basement Sidewall Insulation - gas furnace / CAC baseline	SF	NLI	Retrofit	21%	19	25	$2,754.00	25%	82.0%	17.3%	2.8	20,300	319,920	1,826	211,918	1,854	60,061
5074	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	SF	LI	DI	33%	35	25	$1,528.30	100%	82.0%	57.8%	2.3	16,259	256,237	1,463	169,733	1,146	49,258
5075	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	SF	LI	DI	15%	13	25	$1,168.70	100%	82.0%	57.8%	1.1	11,286	177,871	1,015	117,823	796	34,193
5076	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	SF	LI	DI	10%	8	25	$988.90	100%	82.0%	57.8%	0.7	11,182	176,234	1,006	116,739	788	33,879
5077	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	SF	LI	DI	2%	1	20	$268.00	100%	82.0%	57.8%	0.5	2,439	38,441	682	29,692	449	9,137
5078	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	SF	LI	DI	20%	14	15	$576.60	69%	82.0%	39.5%	2.8	14,396	226,876	4,024	147,036	2,858	29,164
5079	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	SF	LI	Retrofit	34%	37	25	$2,696.40	100%	82.0%	57.8%	1.2	24,193	381,284	2,176	252,566	1,705	73,297
5080	HVAC Shell	Basement Sidewall Insulation - gas furnace / CAC baseline	SF	LI	Retrofit	21%	19	25	$2,754.00	25%	82.0%	17.3%	2.8	7,132	112,404	642	74,458	470	8,318
5081	HVAC Shell	Radiant Barrier	SF	N/A	Retrofit	0%	0	20	$386.57	61%	82.0%	34.6%	2.1	0	0	0	0	0	0
5082	HVAC Shell	Cool Roof	SF	N/A	Retrofit	0%	0	20	$3,596.00	61%	82.0%	34.6%	0.4	0	0	0	0	0	0
5083	HVAC Shell	ENERGY STAR Windows - gas furnace / CAC baseline	SF	N/A	Retrofit	1%	1	25	$10,490.40	61%	82.0%	34.6%	0.0	2,632	41,487	0	0	0	0
5084	HVAC Shell	ENERGY STAR Door - gas furnace / CAC baseline	SF	N/A	Retrofit	2%	1	25	$388.00	61%	82.0%	34.6%	0.7	5,100	80,382	0	0	0	0
5085	HVAC Shell	Smart Window Coverings - Film/Transformer - gas furnace / CAC baseline	SF	N/A	Retrofit	16%	11	7	$6,026.40	61%	82.0%	34.6%	0.2	32,462	179,061	0	0	0	0
5086	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	MF	NLI	DI	41%	40	25	$1,904.00	37%	82.0%	22.0%	9.3	1,061	16,715	62	10,385	30	3,006
5087	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	MF	NLI	DI	21%	15	25	$1,456.00	48%	82.0%	27.9%	3.1	1,323	20,855	77	12,958	47	4,755
5088	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	MF	NLI	DI	15%	10	25	$1,232.00	57%	82.0%	32.3%	2.2	309	4,869	18	3,025	9	1,203
5089	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	MF	NLI	DI	6%	4	20	$165.60	91%	82.0%	51.8%	6.7	375	5,908	51	4,146	43	2,820
5090	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	MF	NLI	Retrofit	14%	9	15	$347.20	61%	82.0%	34.6%	3.4	678	8,013	61	6,467	67	3,090
5091	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	MF	NLI	Retrofit	32%	28	25	$1,688.40	61%	82.0%	34.6%	3.2	2,808	44,249	253	29,311	276	14,806
5092	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	MF	LI	DI	41%	40	25	$1,904.00	84%	82.0%	48.0%	4.1	1,320	20,804	119	13,781	77	3,319
5093	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	MF	LI	DI	21%	15	25	$1,456.00	100%	82.0%	57.8%	1.4	1,647	25,957	148	17,194	116	4,990
5094	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	MF	LI	DI	15%	10	25	$1,232.00	100%	82.0%	57.8%	1.0	385	6,060	35	4,014	27	1,165
5095	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	MF	LI	DI	6%	4	20	$165.60	100%	82.0%	57.8%	2.5	467	7,353	130	5,679	86	1,748
5096	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	MF	LI	DI	14%	9	15	$347.20	100%	82.0%	57.8%	1.8	633	9,973	177	6,464	139	1,852
5097	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	MF	LI	Retrofit	32%	28	25	$1,688.40	100%	82.0%	57.8%	2.0	3,495	55,075	314	36,482	246	10,587
5098	HVAC Shell	ENERGY STAR Windows - gas furnace / CAC baseline	MF	N/A	Retrofit	1%	1	25	$6,316.80	61%	82.0%	34.6%	0.1	67	1,062	0	0	0	0
5099	HVAC Shell	ENERGY STAR Door - gas furnace / CAC baseline	MF	N/A	Retrofit	2%	1	25	$194.00	61%	82.0%	34.6%	1.5	177	2,792	16	1,849	17	934
5100	HVAC Shell	Smart Window Coverings - Film/Transformer - gas furnace / CAC baseline	MF	N/A	Retrofit	16%	9	7	$3,628.80	61%	82.0%	34.6%	0.3	1,277	7,041	0	0	0	0
5101	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	SF	NLI	DI	33%	35	25	$1,528.30	46%	82.0%	26.6%	5.2	52,951	834,502	3,089	518,507	714	144,298
5102	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	SF	NLI	DI	15%	13	25	$1,168.70	60%	82.0%	34.0%	2.4	36,757	579,285	2,145	359,931	634	128,078
5103	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	SF	NLI	DI	10%	8	25	$988.90	71%	82.0%	40.4%	1.6	36,418	573,951	2,125	356,617	747	150,949
5104	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	SF	NLI	DI	2%	1	20	$268.00	56%	82.0%	31.9%	1.2	7,944	125,193	463	77,787	129	26,001
5105	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	SF	NLI	Retrofit	20%	14	15	$576.60	61%	82.0%	34.6%	3.2	40,456	478,186	3,639	385,920	3,981	184,417
5106	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	SF	NLI	Retrofit	34%	37	25	$2,696.40	61%	82.0%	34.6%	2.0	78,792	1,241,753	7,088	822,548	7,754	415,508
5107	HVAC Shell	Basement Sidewall Insulation - gas furnace / CAC baseline	SF	NLI	Retrofit	21%	19	25	$2,754.00	25%	82.0%	17.3%	2.8	23,228	366,075	2,089	242,491	2,121	68,726
5108	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	SF	LI	DI	33%	35	25	$1,528.30	46%	82.0%	26.6%	5.2	18,029	284,133	1,052	176,543	765	26,641
5109	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	SF	LI	DI	15%	13	25	$1,168.70	60%	82.0%	34.0%	2.4	12,515	197,236	730	122,550	518	22,257
5110	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	SF	LI	DI	10%	8	25	$988.90	71%	82.0%	40.4%	1.6	12,400	195,420	723	121,422	459	24,578
5111	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	SF	LI	DI	2%	1	20	$268.00	100%	82.0%	57.8%	0.5	2,705	42,626	243	28,236	191	8,194
5112	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	SF	LI	DI	20%	14	15	$576.60	69%	82.0%	39.5%	2.8	10,331	162,814	1,402	101,649	839	19,675
5113	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	SF	LI	Retrofit	34%	37	25	$2,696.40	100%	82.0%	57.8%	1.2	26,827	422,795	2,413	280,063	1,891	81,277
5114	HVAC Shell	Basement Sidewall Insulation - gas furnace / CAC baseline	SF	LI	Retrofit	21%	19	25	$2,754.00	25%	82.0%	17.3%	2.8	7,909	124,642	711	82,564	521	9,223
5115	HVAC Shell	ENERGY STAR Windows - gas furnace / CAC baseline	SF	N/A	Retrofit	1%	1	25	$10,490.40	61%	82.0%	34.6%	0.0	6,512	102,622	0	0	0	0
5116	HVAC Shell	ENERGY STAR Door - gas furnace / CAC baseline	SF	N/A	Retrofit	2%	1	25	$388.00	61%	82.0%	34.6%	0.7	12,516	197,248	0	0	0	0
5117	HVAC Shell	Smart Window Coverings - Film/Transformer - gas furnace / CAC baseline	SF	N/A	Retrofit	16%	11	7	$6,026.40	61%	82.0%	34.6%	0.2	36,847	203,246	0	0	0	0
5118	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	MF	NLI	DI	41%	40	25	$1,904.00	37%	82.0%	22.0%	9.3	1,547	24,388	90	15,153	17	3,488
5119	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	MF	NLI	DI	21%	15	25	$1,456.00	48%	82.0%	27.9%	3.1	1,931	30,428	113	18,906	27	5,519
5120	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	MF	NLI	DI	15%	10	25	$1,232.00	57%	82.0%	32.3%	2.2	451	7,104	26	4,414	7	1,496
5121	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	MF	NLI	DI	6%	4	20	$165.60	100%	82.0%	57.8%	2.5	547	8,619	32	5,356	16	3,247
5122	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	MF	NLI	Retrofit	14%	9	15	$347.20	100%	82.0%	57.8%	1.8	640	7,566	58	6,106	62	4,576
5123	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	MF	NLI	Retrofit	32%	28	25	$1,688.40	100%	82.0%	57.8%	2.0	4,097	64,562	369	42,766	400	32,534
5124	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R0 existing)	MF	LI	DI	41%	40	25	$1,904.00	37%	82.0%	22.0%	9.3	1,994	31,419	116	19,522	70	2,437
5125	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R7 existing)	MF	LI	DI	21%	15	25	$1,456.00	48%	82.0%	27.9%	3.1	2,487	39,202	145	24,357	84	3,629
5126	HVAC Shell	Attic Insulation - gas furnace / CAC baseline (R11 existing)	MF	LI	DI	15%	10	25	$1,232.00	57%	82.0%	32.3%	2.2	581	9,152	34	5,687	23	983

Appendix A: Residential Measure Assumption Detail

															MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
5127	HVAC Shell	Duct Sealing - gas furnace / CAC baseline	MF	LI	DI	6%	4	20	$165.60	91%	82.0%	51.8%	6.7	705	11,105	63	7,356	58	2,032
5128	HVAC Shell	Infiltration Reduction - gas furnace / CAC baseline	MF	LI	DI	14%	9	15	$347.20	61%	82.0%	34.6%	3.4	619	9,748	84	6,086	44	1,031
5129	HVAC Shell	Wall Insulation - gas furnace / CAC baseline	MF	LI	Retrofit	32%	28	25	$1,688.40	61%	82.0%	34.6%	3.2	5,278	83,177	475	55,097	375	10,731
5130	HVAC Shell	ENERGY STAR Windows - gas furnace / CAC baseline	MF	N/A	Retrofit	1%	1	25	$6,316.80	61%	82.0%	34.6%	0.1	218	3,442	0	0	0	0
5131	HVAC Shell	ENERGY STAR Door - gas furnace / CAC baseline	MF	N/A	Retrofit	2%	1	25	$194.00	61%	82.0%	34.6%	1.5	570	8,977	51	5,946	56	3,004
5132	HVAC Shell	Smart Window Coverings - Film/Transformer - gas furnace / CAC baseline	MF	N/A	Retrofit	16%	9	7	$3,628.80	61%	82.0%	34.6%	0.3	1,899	10,474	0	0	0	0

Appendix C C&I Electric Energy Efficiency Measure Data

Appendix C: C&I Electric Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
1	Interior Lighting	LED ≤20W Replacing Incandescent >90W	Commercial - Existing	Prescriptive	Retrofit	83%	310	0.064	6	$2.9	88%	69.1%	69.1%	62.1	11	0	12	0	0	0
2	Interior Lighting	LED ≤17W Replacing Incandescent 66-90W	Commercial - Existing	Prescriptive	Retrofit	83%	242	0.050	6	$3.6	98%	69.1%	69.1%	34.7	11	0	12	0	0	0
3	Interior Lighting	Delamping-T12 4ft Delamping	Commercial - Existing	Prescriptive	Retrofit	57%	73	0.024	15	$4.0	75%	69.1%	69.1%	33.0	364	0	402	0	0	0
4	Interior Lighting	LED 2x2 Recessed Fixture Replacing T8 2 lamp U-Tube	Commercial - Existing	Prescriptive	Retrofit	37%	97	0.020	12	$108.8	3%	69.1%	49.4%	29.8	1,063	0	1,174	0	0	0
5	Interior Lighting	LED ≤ 12W Replacing Incandescent 25-45W	Commercial - Existing	Prescriptive	Retrofit	85%	155	0.032	6	$3.3	90%	69.1%	69.1%	25.9	11	0	12	0	0	0
6	Interior Lighting	LED ≤15W Replacing Incandescent 46-65W	Commercial - Existing	Prescriptive	Retrofit	85%	202	0.042	6	$4.6	88%	69.1%	69.1%	25.4	11	0	12	0	0	0
7	Interior Lighting	LED 2x2 Recessed Fixture Replacing T12 2 Lamp U-Tube	Commercial - Existing	Prescriptive	Retrofit	46%	142	0.029	12	$108.8	7%	69.1%	49.4%	16.3	296	0	327	0	0	0
8	Interior Lighting	LED Tube Relamp Replacing T12	Commercial - Existing	Prescriptive	Retrofit	57%	85	0.018	12	$20.0	25%	69.1%	63.4%	15.8	364	0	402	0	0	0
9	Interior Lighting	LED Exit Sign Retrofit-Replacement	Commercial - Existing	Prescriptive	Retrofit	84%	81	0.009	16	$80.0	6%	69.1%	49.4%	15.4	246	246	272	0	0	60
10	Interior Lighting	LED 2x4 Recessed Fixture Replacing T8 4ft 3 Lamp or 4 Lamp	Commercial - Existing	Prescriptive	Retrofit	56%	203	0.042	14	$49.2	30%	69.1%	63.4%	14.1	1,599	0	1,767	0	0	0
11	Interior Lighting	LED Tube Relamp Replacing T8	Commercial - Existing	Prescriptive	Retrofit	46%	55	0.011	12	$20.0	20%	69.1%	63.4%	12.5	1,322	0	1,460	0	0	0
12	Interior Lighting	LED <10W Replacing Incandescent <25W	Commercial - Existing	Prescriptive	Retrofit	72%	67	0.010	6	$4.9	51%	69.1%	69.1%	11.9	9	0	10	0	0	0
13	Interior Lighting	LED Fixture Replacing T5HO 4ft 8 Lamp	Commercial - Existing	Prescriptive	Retrofit	46%	1,007	0.208	11	$85.3	88%	69.1%	69.1%	11.5	1,320	0	1,458	0	0	0
14	Interior Lighting	LED Tube Relamp Replacing T5HO	Commercial - Existing	Prescriptive	Retrofit	53%	88	0.016	15	$10.0	90%	69.1%	69.1%	10.3	1,527	0	1,687	0	0	0
15	Interior Lighting	LED Fixture Replacing T5HO 4ft 4 Lamp	Commercial - Existing	Prescriptive	Retrofit	48%	405	0.084	11	$215.7	16%	69.1%	57.5%	10.3	1,371	0	1,514	0	0	0
16	Interior Lighting	LED Interior Replacing HID ≤ 175W	Commercial - Existing	Prescriptive	Retrofit	81%	283	0.059	20	$86.3	58%	69.1%	63.4%	7.7	387	1,937	428	0	0	1,229
17	Interior Lighting	LED Fixture Replacing T5HO 4ft 6 Lamp	Commercial - Existing	Prescriptive	Retrofit	36%	431	0.089	11	$150.5	45%	69.1%	63.4%	5.5	1,023	0	1,130	0	0	0
18	Interior Lighting	LED Tube Relamp Replacing T5	Commercial - Existing	Prescriptive	Retrofit	18%	16	0.003	18	$10.0	40%	69.1%	57.5%	4.7	527	1,582	583	0	0	637
19	Interior Lighting	Lighting Power Density Reduction	Commercial - Existing	Custom	Retrofit	10%	4,077	0.704	15	$220.0	100%	69.1%	78.0%	19.1	1,016	15,238	794	873	7,895	14,757
20	Interior Lighting	Occupancy Sensor - 100W - 199W Connected Load Replacing No Existing Controls	Commercial - Existing	Prescriptive	Retrofit	30%	135	0.020	8	$42.0	13%	69.1%	63.4%	14.1	511	4,090	449	449	410	3,282
21	Interior Lighting	Occupancy Sensor - 501W - 1000W Connected Load Replacing No Existing Controls	Commercial - Existing	Prescriptive	Retrofit	30%	711	0.170	8	$125.0	44%	69.1%	69.1%	9.0	511	4,090	449	449	447	3,574
22	Interior Lighting	Occupancy Sensor - 200W - 500W Connected Load Replacing No Existing Controls	Commercial - Existing	Prescriptive	Retrofit	30%	315	0.050	8	$66.0	38%	69.1%	63.4%	7.4	511	4,090	449	449	410	3,282
23	Interior Lighting	Smart Web-based lighting Mgmt System	Commercial - Existing	Custom	Retrofit	35%	3	0.001	10	$1.2	30%	69.1%	71.6%	7.3	0	0	0	0	0	0
24	Interior Lighting	Smart Advanced Lighting Controls	Commercial - Existing	Custom	Retrofit	47%	2	0.000	10	$0.9	24%	69.1%	71.6%	7.2	3,570	35,700	3,052	3,136	9,707	32,356
25	Interior Lighting	NC - Lighting Upgrades - Interior	Commercial - Existing	Custom	Retrofit	66%	138	0.030	15	$100.0	14%	69.1%	55.8%	11.2	0	0	0	0	0	0
26	Interior Lighting	Lighting - Interior - LED	Commercial - Existing	Custom	Retrofit	60%	220	0.010	12	$95.0	23%	69.1%	71.6%	6.4	5,509	0	6,087	0	0	0
27	Interior Lighting	Lighting - Interior - CFLs	Commercial - Existing	Custom	Retrofit	50%	20	0.000	12	$3.0	67%	69.1%	78.0%	5.5	0	0	0	0	0	0
28	Interior Lighting	Custom RCx Project - Lighting	Commercial - Existing	Custom	Retrofit	20%	20,000	4.444	5	$10,000.0	20%	69.1%	64.9%	4.4	1,298	0	2,398	0	0	0
29	Exterior Lighting	LED Exterior Replacing HID ≤ 175W	Commercial - Existing	Prescriptive	Retrofit	70%	593	0.000	13	$241.2	19%	69.1%	63.4%	7.8	85	1,100	66	66	394	853
30	Exterior Lighting	LED Exterior Replacing HID 176-250W	Commercial - Existing	Prescriptive	Retrofit	69%	898	0.000	13	$205.0	38%	69.1%	63.4%	6.8	83	1,081	65	65	387	839
31	Exterior Lighting	Lighting Power Density - Exterior	Commercial - Existing	Custom	Retrofit	10%	4,319	0.000	12	$220.0	100%	69.1%	78.0%	10.9	0	0	0	0	0	0
32	Exterior Lighting	Lighting - Exterior - LED	Commercial - Existing	Custom	Retrofit	69%	1,364	0.000	13	$100.0	100%	69.1%	78.0%	8.1	62	806	48	48	290	629
33	Exterior Lighting	Lighting - Exterior - T5/T8	Commercial - Existing	Custom	Retrofit	40%	250	0.000	15	$75.0	33%	69.1%	71.6%	6.7	0	4	0	0	2	3
34	Exterior Lighting	NC - Lighting Upgrades - Exterior	Commercial - Existing	Custom	Retrofit	66%	41	0.000	15	$18.0	23%	69.1%	71.6%	6.7	0	0	0	0	0	0
35	Exterior Lighting	Lighting - Exterior - CFLs	Commercial - Existing	Custom	Retrofit	66%	50	0.000	12	$5.0	100%	69.1%	78.0%	5.5	0	0	0	0	0	0
36	Space Cooling	Water Source HP - Under 1.42 Tons (≥12 SEER) Replacing Water Source HP Under 1.42 Tons (<12 SEER)	Commercial - Existing	Prescriptive	ROB	13%	94	0.098	15	$50.0	10%	69.1%	45.8%	53.7	18	267	12	12	65	122
37	Space Cooling	PTHP - >1.25 Tons (≥14 SEER) Replacing PTHP - <1.25 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	9%	82	0.086	15	$50.0	10%	69.1%	45.8%	49.5	3	44	2	2	11	20
38	Space Cooling	Ground Source HP - <11.25 Tons (≥14.3 SEER) Replacing Ground Source HP - <11.25 Tons (<14.3 SEER)	Commercial - Existing	Prescriptive	ROB	22%	165	0.172	15	$50.0	20%	69.1%	50.5%	47.1	29	430	20	20	116	217
39	Space Cooling	PTHP - Between 0.58 and 1.25 Tons (≥14 SEER) Replacing PTHP - Between 0.58 and 1.25 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	10%	76	0.079	15	$50.0	10%	69.1%	45.8%	45.5	3	45	2	2	11	21
40	Space Cooling	Air Source HP - Between 5.4 and 11.3 Tons (≥11.5 SEER) Replacing Air Source HP Between 5.4 and 11.3 Tons (<11.5 SEER)	Commercial - Existing	Prescriptive	ROB	14%	96	0.100	15	$50.0	13%	69.1%	45.8%	43.6	18	269	12	12	66	123
41	Space Cooling	Water Source HP - Between 1.42 and 5.42 Tons (≥12.8 SEER) Replacing Water Source HP Between 1.42 and 5.42 Tons (<12.8 SEER)	Commercial - Existing	Prescriptive	ROB	13%	84	0.087	15	$50.0	11%	69.1%	45.8%	42.4	17	253	12	12	62	116
42	Space Cooling	PTHP - <0.58 Tons (≥14 SEER) Replacing PTHP - <0.58 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	9%	68	0.071	15	$50.0	10%	69.1%	39.3%	40.8	3	45	2	2	9	18
43	Space Cooling	Air Source HP - Between 11.3 and 20 Tons (≥11 SEER) Replacing Air Source HP Between 11.3 and 20 Tons (<11 SEER)	Commercial - Existing	Prescriptive	ROB	14%	105	0.109	15	$50.0	18%	69.1%	45.8%	34.3	19	281	13	13	69	129
44	Space Cooling	Water Source HP - Between 5.43 and 11.25 Tons (≥12.8 SEER) Replacing Water Source HP Between 5.43 and 11.25 Tons (<12.8 SEER)	Commercial - Existing	Prescriptive	ROB	13%	84	0.087	15	$50.0	15%	69.1%	45.8%	32.9	17	253	12	12	62	116
45	Space Cooling	PTAC - >1.25 Tons (≥14 SEER) Replacing PTAC - >1.25 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	9%	82	0.086	15	$100.0	8%	69.1%	39.3%	31.3	3	44	2	2	9	17
46	Space Cooling	PTAC - Between 0.58 and 1.25 Tons (≥14 SEER) Replacing PTAC - Between 0.58 and 1.25 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	10%	76	0.079	15	$100.0	8%	69.1%	29.0%	28.8	3	45	2	2	7	13
47	Space Cooling	PTAC - <0.58 Tons (≥14 SEER) Replacing PTAC - <0.58 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	9%	68	0.071	15	$100.0	8%	69.1%	29.0%	25.8	3	45	2	2	7	13
48	Space Cooling	Ground Source HP - <11.25 Tons (≥17.3 SEER) Replacing Ground Source HP - <11.25 Tons (<17.3 SEER)	Commercial - Existing	Prescriptive	ROB	28%	133	0.138	15	$50.0	34%	69.1%	50.5%	22.4	37	555	26	26	149	280
49	Space Cooling	RTU AC - 65,000 - 135,000 BTHU (≥ 11.0 EER) Replacing RTU AC - 65,000 - 135,000 BTHU (< 11.0 EER)	Commercial - Existing	Prescriptive	Retrofit	13%	86	0.079	15	$100.0	12%	69.1%	39.3%	18.6	1,068	16,021	738	738	3,361	6,302
50	Space Cooling	Air Source HP - < 5.4 Tons (≥14 SEER) Replacing Air Source HP - < 5.4 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	4%	29	0.031	15	$50.0	10%	69.1%	29.0%	16.8	5	81	4	4	12	23
51	Space Cooling	Water Cooled Chiller	Commercial - Existing	Custom	ROB	13%	191	0.070	20	$177.7	13%	69.1%	44.4%	14.7	95	1,892	3	65	441	490
52	Space Cooling	Air Cooled Chiller	Commercial - Existing	Custom	ROB	13%	318	0.116	20	$127.0	30%	69.1%	57.0%	14.7	101	2,012	3	69	564	612
53	Space Cooling	Room AC	Commercial - Existing	Custom	ROB	4%	16	0.011	9	$40.0	5%	69.1%	32.7%	11.5	4	38	0	3	3	12
54	Space Cooling	Smart Cloud-Based Enery Information System (EIS)	Commercial - Existing	Custom	Retrofit	8%	120	0.000	10	$0.6	100%	69.1%	62.1%	92.9	409	4,092	13	292	794	2,296
55	Space Cooling	Chiller - Maintenance	Commercial - Existing	Custom	Retrofit	8%	187	0.051	5	$5.7	100%	69.1%	62.1%	15.8	424	2,120	14	304	0	1,351
56	Space Cooling	Advanced Rooftop Controls	Commercial - Existing	Custom	Retrofit	30%	2,474	1.938	10	$2,500.0	12%	69.1%	44.4%	14.0	3,515	35,152	113	2,506	4,934	14,775
57	Space Cooling	Windows - Install Reflective Film	Commercial - Existing	Custom	Retrofit	5%	189	0.050	10	$35.5	64%	69.1%	62.1%	7.3	453	4,528	80	344	999	3,316
58	Space Cooling	Insulation - Ceiling	Commercial - Existing	Custom	Retrofit	8%	1,021	0.000	20	$4,640.0	3%	69.1%	32.7%	6.9	157	3,136	127	127	1,694	2,607
59	Space Cooling	Programmable Thermostat - Electric Cooling Replacing No programmable Thermostat/Manual Thermostat	Commercial - Existing	Prescriptive	Retrofit	10%	154	0.000	8	$36.2	29%	69.1%	50.5%	5.7	438	3,502	333	333	262	2,094
60	Space Cooling	Programmable Thermostat - Heat Pump Replacing No programmable Thermostat/Manual Thermostat	Commercial - Existing	Prescriptive	Retrofit	10%	242	0.000	8	$36.2	55%	69.1%	55.0%	4.7	438	3,502	333	333	285	2,280
61	Space Cooling	Programmable Thermostat - Electric Cooling and Heat Replacing No programmable Thermostat/Manual Thermostat	Commercial - Existing	Prescriptive	Retrofit	10%	273	0.000	8	$36.2	64%	69.1%	55.0%	4.6	438	3,502	333	333	285	2,280
62	Space Cooling	RTU - Maintenance	Commercial - Existing	Custom	Retrofit	15%	134	0.000	3	$35.0	46%	69.1%	57.0%	1.2	4,776	14,327	163	3,631	0	9,529
63	Space Cooling	Insulation - Wall Cavity	Commercial - Existing	Custom	Retrofit	8%	252	-0.080	20	$657.3	5%	69.1%	32.7%	0.2	132	2,643	113	113	1,586	2,441
64	Space Cooling	HVAC - Chillers	Commercial - Existing	Custom	ROB	20%	877	0.160	20	$140.0	75%	69.1%	62.1%	10.8	614	12,279	19	424	4,400	5,169
65	Space Cooling	NC - HVAC	Commercial - Existing	Custom	ROB	20%	465	0.150	12	$155.0	36%	69.1%	57.0%	9.4	0	0	0	0	0	0
66	Space Cooling	NC - Motors & Drives	Commercial - Existing	Custom	ROB	20%	1,050	0.065	15	$120.0	100%	69.1%	62.1%	7.0	0	0	0	0	0	0
67	Space Cooling	Pumps & Fans	Commercial - Existing	Custom	ROB	20%	1,200	0.020	15	$189.0	76%	69.1%	62.1%	5.8	857	12,853	27	592	3,860	5,487
68	Space Cooling	NC - EMS - Electric	Commercial - Existing	Custom	ROB	20%	1,053	0.000	10	$325.0	39%	69.1%	57.0%	4.0	0	0	0	0	0	0
69	Space Cooling	NC - Whole Building Design - Electric	Commercial - Existing	Custom	ROB	20%	20,000	0.000	10	$4,000.0	60%	69.1%	62.1%	4.0	0	0	0	0	0	0
70	Space Cooling	Custom RCx Project - EMS	Commercial - Existing	Custom	Retrofit	20%	30,000	5.556	5	$4,800.0	75%	69.1%	62.1%	3.4	3,137	15,687	97	2,167	0	9,711

Appendix C: C&I Electric Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
71	Space Heating	PTHP - to 0.58 Tons 14+ SEER	Commercial - Existing	Prescriptive	ROB	8%	106	0.000	15	$50	10%	69.1%	45.8%	14.9	3	52	2	2	13	24
72	Space Heating	PTHP - 1.25+ Tons 14+ SEER	Commercial - Existing	Prescriptive	ROB	7%	95	0.000	15	$50	10%	69.1%	45.8%	13.4	3	44	2	2	11	20
73	Space Heating	Ground Source HP - <11.25 Tons (≥14.3 SEER) Replacing Ground Source HP - <11.25 Tons (<14.3 SEER)	Commercial - Existing	Prescriptive	ROB	14%	186	0.000	15	$50	20%	69.1%	50.5%	12.4	6	91	4	4	24	46
74	Space Heating	PTHP - 0.58 - 1.25 Tons 14 SEER	Commercial - Existing	Prescriptive	ROB	5%	79	0.000	15	$50	10%	69.1%	45.8%	11.1	2	34	2	2	8	16
75	Space Heating	Air Source HP - < 5.4 Tons (≥14 SEER) Replacing Air Source HP - < 5.4 Tons (<14 SEER)	Commercial - Existing	Prescriptive	ROB	4%	74	0.000	15	$50	10%	69.1%	39.3%	9.9	2	26	1	1	6	10
76	Space Heating	Ground Source HP - <11.25 Tons (≥17.3 SEER) Replacing Ground Source HP - <11.25 Tons (<17.3 SEER)	Commercial - Existing	Prescriptive	ROB	14%	168	0.000	15	$50	34%	69.1%	50.5%	6.6	6	92	4	4	25	46
77	Space Heating	ECM on Furnace Replacing Furnace with No ECM	Commercial - Existing	Prescriptive	Retrofit	65%	720	0.000	20	$250	46%	69.1%	50.5%	5.2	0	0	0	0	0	0
78	Space Heating	Air Source HP - Between 5.4 and 11.3 Tons (≥11.5 SEER) Replacing Air Source HP Between 5.4 and 11.3 Tons (<11.5 SEER)	Commercial - Existing	Prescriptive	ROB	3%	40	0.000	15	$50	13%	69.1%	39.3%	4.2	1	19	1	1	4	8
79	Space Heating	Air Source HP - Between 11.3 and 20 Tons (≥11 SEER) Replacing Air Source HP Between 11.3 and 20 Tons (<11 SEER)	Commercial - Existing	Prescriptive	ROB	3%	42	0.000	15	$50	18%	69.1%	39.3%	3.2	1	20	1	1	4	8
80	Space Heating	Water Source HP - Under 1.42 Tons (≥12 SEER) Replacing Water Source HP Under 1.42 Tons (<12 SEER)	Commercial - Existing	Prescriptive	ROB	2%	23	0.000	15	$50	10%	69.1%	29.0%	3.1	1	15	1	1	2	4
81	Space Heating	Water Source HP - Between 1.42 and 5.42 Tons (≥12.8 SEER) Replacing Water Source HP Between 1.42 and 5.42 Tons (<12.8 SEER)	Commercial - Existing	Prescriptive	ROB	2%	23	0.000	15	$50	11%	69.1%	29.0%	2.8	1	15	1	1	2	4
82	Space Heating	Water Source HP - Between 5.43 and 11.25 Tons (≥12.8 SEER) Replacing Water Source HP Between 5.43 and 11.25 Tons (<12.8 SEER)	Commercial - Existing	Prescriptive	ROB	2%	23	0.000	15	$50	15%	69.1%	29.0%	2.2	1	15	1	1	2	4
83	Space Heating	Space Heating - Heat Recovery Ventilator	Commercial - Existing	Custom	Retrofit	30%	2	0.003	15	$6	3%	69.1%	32.7%	36.1	0	0	0	0	0	0
84	Space Heating	Electric Zonal Heat	Commercial - Existing	Custom	Retrofit	10%	286	0.000	15	$15	100%	69.1%	62.1%	12.7	0	0	0	0	0	0
85	Space Heating	Insulation - Ceiling	Commercial - Existing	Custom	Retrofit	8%	1,590	0.000	20	$6,960	3%	69.1%	32.7%	6.9	87	1,737	5	60	366	500
86	Space Heating	Insulation - Wall Cavity	Commercial - Existing	Custom	Retrofit	2%	1,173	0.000	20	$2,629	5%	69.1%	32.7%	6.9	21	414	1	15	90	123
87	Space Heating	Custom RCx Project - HVAC	Commercial - Existing	Custom	Retrofit	20%	30,000	0.000	5	$10,000	36%	69.1%	57.0%	2.1	447	2,235	14	309	0	1,271
88	Ventilation	Insulation - Ducting	Commercial - Existing	Custom	Retrofit	20%	61	0.004	20	$66	11%	69.1%	44.4%	8.2	1,756	35,127	407	1,213	10,145	15,218
89	Ventilation	HVAC - Duct Repair and Sealing	Commercial - Existing	Custom	Retrofit	23%	70	0.000	18	$200	4%	69.1%	32.7%	6.4	2,317	41,698	536	1,600	10,575	17,305
90	Ventilation	NC - Elec - Other Systems	Commercial - Existing	Custom	Retrofit	20%	2,290	0.020	10	$205	100%	69.1%	62.1%	5.4	5,620	56,204	175	3,881	10,307	29,812
91	Cooking	ENERGY STAR Steamer - 3 Pan Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	57%	5,018	1.351	12	$3,500	11%	69.1%	39.3%	13.0	193	2,312	104	133	482	1,156
92	Cooking	ENERGY STAR Holding Cabinet -- 1/2 Size -- ENERGY STAR Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	58%	1,788	0.330	12	$1,783	7%	69.1%	39.3%	12.9	26	317	6	18	52	124
93	Cooking	ENERGY STAR Steamer - 6 Pan Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	57%	10,353	2.787	12	$3,500	25%	69.1%	50.5%	12.2	118	1,417	64	82	298	715
94	Cooking	ENERGY STAR Steamer - 5 Pan Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	57%	8,727	2.350	12	$3,500	21%	69.1%	50.5%	12.0	118	1,417	64	82	298	715
95	Cooking	ENERGY STAR Griddle Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	12%	7,147	1.924	12	$2,090	30%	69.1%	50.5%	11.8	6	67	1	4	14	34
96	Cooking	Holding Cabinets - Insulated - FA2 Full Size -ENERGY STAR Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	69%	5,278	0.960	12	$1,783	25%	69.1%	50.5%	10.6	5	59	3	3	12	30
97	Cooking	ENERGY STAR Oven - Combo Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	48%	18,432	3.530	12	$2,150	73%	69.1%	55.0%	10.6	17	207	10	12	51	122
98	Cooking	ENERGY STAR Oven - Convection Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	27%	3,235	0.620	12	$1,113	25%	69.1%	50.5%	10.5	163	1,950	96	112	479	1,151
99	Cooking	ENERGY STAR Fryer Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	17%	983	0.220	12	$500	18%	69.1%	45.8%	10.4	8	91	2	5	17	42
100	Cooking	ENERGY STAR Steamer - 4 Pan Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	57%	6,416	1.727	12	$3,500	19%	69.1%	45.8%	9.8	4	49	2	3	10	24
101	Behavioral	SEM	Commercial - Existing	Custom	Retrofit	3%	1	0.000	5	$0	45%	69.1%	57.0%	2.8	1,366	6,831	365	1,087	0	4,732
102	Behavioral	Whole-Building Energy Monitoring	Commercial - Existing	Custom	Retrofit	2%	1	0.000	3	$0	27%	69.1%	57.0%	1.8	1,139	3,416	304	906	0	2,366
103	Behavioral	Building Operator Certification	Commercial - Existing	Custom	Retrofit	1%	190	0.021	3	$32	71%	69.1%	62.1%	1.7	486	1,457	130	386	0	1,099
104	Behavioral	Behavior Based Efficiency (Commercial Energy Reports)	Commercial - Existing	Custom	Retrofit	0%	1	0.000	2	$0	100%	69.1%	62.1%	0.5	0	0	0	0	0	0
105	Office Equipment	POS Terminal	Commercial - Existing	Custom	ROB	68%	121	0.011	6	$1	100%	69.1%	62.1%	63.0	17	100	17	17	0	99
106	Office Equipment	Printer/Copier/Fax	Commercial - Existing	Custom	ROB	40%	223	0.021	6	$4	100%	69.1%	62.1%	20.9	23	136	22	22	0	135
107	Office Equipment	Computer Room Air Side Economizer	Commercial - Existing	Custom	Retrofit	47%	440	0.000	10	$25	100%	69.1%	62.1%	8.4	662	6,622	21	457	1,233	3,806
108	Office Equipment	VFD for Process Fans -CRAC units	Commercial - Existing	Custom	Retrofit	43%	2,279	0.000	15	$200	100%	69.1%	62.1%	7.6	403	6,051	13	279	1,923	2,965
109	Office Equipment	Computer Room Air Conditioner Economizer	Commercial - Existing	Custom	Retrofit	47%	358	0.000	15	$82	52%	69.1%	62.1%	5.6	441	6,622	14	305	2,105	3,246
110	Office Equipment	Computer Room Hot Aisle Cold Aisle Configuration	Commercial - Existing	Custom	Retrofit	13%	125	0.000	15	$156	10%	69.1%	44.4%	5.6	121	1,820	4	84	421	673
111	Office Equipment	Electrically Commutated Plug Fans in data centers	Commercial - Existing	Custom	Retrofit	33%	1,445	0.000	15	$718	24%	69.1%	51.7%	5.6	312	4,686	10	216	1,261	2,017
112	Office Equipment	High Efficiency CRAC unit	Commercial - Existing	Custom	Retrofit	30%	162	0.000	15	$63	31%	69.1%	57.0%	5.6	280	4,199	9	193	1,246	1,994
113	Office Equipment	Laptop	Commercial - Existing	Custom	ROB	32%	40	0.004	6	$6	83%	69.1%	62.1%	3.2	260	1,560	234	234	0	1,404
114	Office Equipment	Monitor	Commercial - Existing	Custom	ROB	21%	15	0.001	6	$12	15%	69.1%	44.4%	3.2	85	507	79	79	0	477
115	Office Equipment	Desktop Computer	Commercial - Existing	Custom	ROB	43%	81	0.000	4	$5	100%	69.1%	62.1%	3.2	2,508	10,031	985	1,732	0	6,227
116	Office Equipment	Server	Commercial - Existing	Custom	ROB	43%	81	0.000	4	$5	100%	69.1%	62.1%	3.2	1,573	6,290	49	1,086	0	3,891
117	Office Equipment	Office Equipment - Plug Load Occupancy Sensors	Commercial - Existing	Custom	Retrofit	15%	169	0.000	8	$70	29%	69.1%	57.0%	3.2	1,386	11,090	46	1,022	860	6,450
118	Office Equipment	Office Equipment - Smart Plug Load Sensors	Commercial - Existing	Custom	Retrofit	15%	23	0.000	8	$15	19%	69.1%	51.7%	3.2	1,386	11,090	46	1,022	780	5,848
119	Other	Compressed Air - Engineered Nozzle -- per shift -- .25'' nozzle	Commercial - Existing	Custom	Retrofit	42%	1,349	0.511	15	$14	100%	69.1%	62.1%	140.8	80	1,197	5	55	391	647
120	Other	Compressed Air - Engineered Nozzle -- per shift -- .125'' nozzle	Commercial - Existing	Custom	Retrofit	42%	430	0.163	15	$14	100%	69.1%	62.1%	44.9	80	1,198	5	55	392	648
121	Other	Transformer - High Efficiency	Commercial - Existing	Custom	Retrofit	2%	552	0.057	30	$810	8%	69.1%	32.7%	11.8	49	984	8	34	314	314
122	Other	VFD on Pool Pump	Commercial - Existing	Custom	Retrofit	20%	1,425	0.254	12	$200	86%	69.1%	62.1%	7.3	103	1,231	6	71	318	717
123	Other	Compressed Air Audits and Leak Repair	Commercial - Existing	Custom	Retrofit	50%	496	0.079	1	$8	100%	69.1%	62.1%	4.8	1,436	1,436	89	992	0	892
124	Other	Motors - Variable Frequency Drive (Compressed Air)	Commercial - Existing	Custom	Retrofit	17%	104,220	4.680	10	$27,160	46%	69.1%	57.0%	4.5	98	977	6	67	167	539
125	Other	NC - Envelope	Commercial - Existing	Custom	Retrofit	20%	30,000	2.000	20	$18,000	20%	69.1%	51.7%	8.4	0	0	0	0	0	0
126	Other	NC - Compressed Air	Commercial - Existing	Custom	ROB	20%	1,336	0.175	15	$300	53%	69.1%	62.1%	7.8	0	0	0	0	0	0
127	Other	NC - Pumps/Fans/VFDs	Commercial - Existing	Custom	ROB	20%	1,615	0.100	15	$364	53%	69.1%	62.1%	6.6	0	0	0	0	0	0
128	Other	EMS/Controls - Electric	Commercial - Existing	Custom	Retrofit	20%	1,550	0.100	10	$200	93%	69.1%	62.1%	4.8	3,938	39,384	247	2,742	7,414	23,925
129	Other	Other - Electric	Commercial - Existing	Custom	Retrofit	20%	7,300	0.300	10	$1,150	76%	69.1%	62.1%	4.5	2,418	24,177	150	1,670	4,503	14,531
130	Other	Custom RCx Project - Other	Commercial - Existing	Custom	Retrofit	20%	50,000	11.111	5	$8,000	75%	69.1%	62.1%	3.6	2,363	11,815	148	1,645	0	7,414
131	Other	Custom RCx Project - Process	Commercial - Existing	Custom	Retrofit	20%	50,000	9.259	5	$8,000	75%	69.1%	62.1%	3.4	2,363	11,815	148	1,645	0	7,414
132	Refrigeration	ECM Cooler Motors Replacing Cooler Shaded Pole or PSC Motors	Commercial - Existing	Prescriptive	ROB	52%	1,365	0.140	15	$226	14%	69.1%	50.5%	38.5	381	5,720	256	263	1,830	3,432
133	Refrigeration	LED Refrigerated Display Case Lighting	Commercial - Existing	Prescriptive	Retrofit	45%	438	0.650	8	$150	29%	69.1%	50.5%	22.8	491	3,931	232	339	248	1,984
134	Refrigeration	ECM Freezer Motors Replacing Freezer Shaded Pole or PSC Motors	Commercial - Existing	Prescriptive	ROB	52%	1,365	0.140	15	$226	24%	69.1%	50.5%	21.9	106	1,589	71	73	509	953
135	Refrigeration	ENERGY STAR Ice Machine - 500-1000 lb/Day Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	14%	1,188	0.117	9	$1,485	3%	69.1%	29.0%	13.6	124	1,116	85	86	156	703
136	Refrigeration	ENERGY STAR Ice Machine - ≥1000 lb/Day Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	20%	1,525	0.146	9	$1,821	4%	69.1%	39.3%	13.3	177	1,595	121	122	223	1,005
137	Refrigeration	LED Freezer Display Case Lighting	Commercial - Existing	Prescriptive	Retrofit	45%	472	0.070	8	$150	32%	69.1%	50.5%	5.7	139	1,113	66	96	70	562
138	Refrigeration	Refrigerator - High Efficiency Compressor	Commercial - Existing	Custom	ROB	1%	875	0.000	13	$552	19%	69.1%	51.7%	4.9	15	192	9	10	53	115
139	Refrigeration	ENERGY STAR Commercial Refrigerator 30- 50ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	26%	393	0.045	12	$750	9%	69.1%	29.0%	4.6	248	2,979	147	171	546	1,311
140	Refrigeration	ENERGY STAR Commercial Freezer 15-30 ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	21%	613	0.070	12	$400	26%	69.1%	45.8%	4.4	69	831	41	48	158	380
141	Refrigeration	ENERGY STAR Commercial Refrigerator 15-30ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	28%	287	0.033	12	$500	10%	69.1%	29.0%	4.4	263	3,161	156	182	579	1,391
142	Refrigeration	Motion Sensors on LED cases Replacing No Controls	Commercial - Existing	Prescriptive	Retrofit	45%	133	0.000	8	$26	52%	69.1%	55.0%	3.8	630	5,044	297	435	346	2,772
143	Refrigeration	ENERGY STAR Commercial Refrigerator ≥50ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	24%	501	0.057	12	$900	11%	69.1%	29.0%	3.8	226	2,711	133	156	497	1,193

Appendix C: C&I Electric Measure Assumption Detail

Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	MWH Tech Potential in 2024	MWH Tech Potential in 2043	MWH MAP Potential in 2024	MWH MAP Potential in 2043	MWH RAP Potential in 2024	MWH RAP Potential in 2043
144	Refrigeration	ENERGY STAR Commercial Freezer <15ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	19%	320	0.037	12	$150	50%	69.1%	50.5%	3.2	61	733	36	42	154	370
145	Refrigeration	ENERGY STAR Commercial Refrigerator <15ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	30%	208	0.024	12	$250	22%	69.1%	39.3%	2.9	290	3,475	171	200	637	1,529
146	Refrigeration	ENERGY STAR Commercial Freezer 30-50 ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	18%	802	0.092	12	$550	47%	69.1%	45.8%	2.3	58	702	35	40	134	321
147	Refrigeration	ENERGY STAR Commercial Freezer >50ft³ Replacing Non-ENERGY STAR Model	Commercial - Existing	Prescriptive	ROB	17%	1,112	0.127	12	$700	59%	69.1%	50.5%	2.0	55	661	33	38	139	333
148	Refrigeration	Refrigerator - Floating Head Pressure	Commercial - Existing	Custom	Retrofit	9%	1,264	0.000	15	$80	100%	69.1%	62.1%	10.5	344	5,167	11	246	1,730	2,667
149	Refrigeration	Auto Door Closers - Walk-In Freezer Replacing Door with manual closer	Commercial - Existing	Custom	Retrofit	15%	2,307	0.309	8	$157	100%	69.1%	62.1%	8.2	61	491	15	44	41	325
150	Refrigeration	Anti-Sweat Heater Controls - Cooler Replacing No Controls	Commercial - Existing	Prescriptive	Retrofit	55%	541	0.000	12	$250	15%	69.1%	45.8%	8.1	227	2,718	111	162	548	1,315
151	Refrigeration	Anti-Sweat Heater Controls - Freezer Replacing No Controls	Commercial - Existing	Prescriptive	Retrofit	55%	1,278	0.000	12	$250	44%	69.1%	55.0%	6.4	283	3,393	137	201	812	1,947
152	Refrigeration	Auto Door Closers - Walk-In cooler Replacing Door with manual closer	Commercial - Existing	Custom	Retrofit	15%	943	0.137	8	$157	72%	69.1%	62.1%	4.8	180	1,438	43	129	118	946
153	Refrigeration	Strip Curtain - Walk-In Freezer Replacing No Cover	Commercial - Existing	Custom	Retrofit	80%	2,974	0.339	6	$256	100%	69.1%	62.1%	4.8	436	2,618	105	314	0	1,735
154	Refrigeration	Strip Curtain - Walk-In Cooler Replacing No Cover	Commercial - Existing	Custom	Retrofit	80%	422	0.048	6	$256	20%	69.1%	51.7%	3.4	1,278	7,667	307	916	0	4,199
155	Refrigeration	Evaporator Fan Controls Installed on Shade Pole or PSC Replacing No Controls	Commercial - Existing	Custom	Retrofit	25%	796	0.082	5	$421	23%	69.1%	51.7%	2.8	825	4,126	337	593	0	2,265
156	Refrigeration	Vending Machine Occupancy Sensor - Refrigerated Beverage Replacing No control	Commercial - Existing	Custom	Retrofit	46%	1,612	0.000	5	$216	90%	69.1%	62.1%	2.1	1,274	6,372	295	880	0	3,956
157	Refrigeration	Vending Machine Occupancy Sensor - Refrigerated Glass Front Cooler Replacing No control	Commercial - Existing	Custom	Retrofit	30%	1,209	0.000	5	$216	67%	69.1%	62.1%	2.1	831	4,156	192	574	0	2,580
158	Refrigeration	NC - Refrigeration	Commercial - Existing	Custom	ROB	20%	75,000	13.889	12	$35,000	26%	69.1%	57.0%	7.4	0	0	0	0	0	0
159	Refrigeration	Refrigeration	Commercial - Existing	Custom	ROB	20%	3,510	0.350	12	$555	76%	69.1%	62.1%	6.1	1,210	14,522	38	836	3,722	7,921
160	Refrigeration	Custom RCx Project - Refrigeration	Commercial - Existing	Custom	Retrofit	20%	30,000	5.556	5	$10,000	36%	69.1%	57.0%	3.4	3,638	18,190	377	2,512	0	10,369
161	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - High Temp /Elec Heat Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	38%	27,408	4.170	20	$970	72%	69.1%	55.0%	47.8	3	59	2	2	26	40
162	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - Low Temp /Elec Heat Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	38%	18,811	2.860	20	$970	62%	69.1%	55.0%	38.3	3	59	2	2	26	40
163	Water Heating	ENERGY STAR Dishwasher - Single Tank Conv - High Temp / Elect Heat Replacing Non-ENERGY STAR model	Commercial - Existing	Prescriptive	ROB	20%	9,212	1.400	20	$2,050	46%	69.1%	55.0%	11.8	2	32	1	1	14	21
164	Water Heating	Energy Star Clothes Washer	Commercial - Existing	Custom	ROB	31%	485	0.324	7	$63	93%	69.1%	62.1%	9.2	76	532	2	52	0	315
165	Water Heating	Heat Pump Water Heater	Commercial - Existing	Custom	ROB	59%	2,124	0.000	10	$433	59%	69.1%	62.1%	4.0	280	2,800	9	193	519	1,554
166	Water Heating	Water Heater - Faucet Aerators/Low Flow Nozzles	Commercial - Existing	Custom	Retrofit	33%	848	0.097	10	$3	100%	69.1%	62.1%	220.5	51	506	2	41	116	346
167	Water Heating	Pre-rinse Spray Valves	Commercial - Existing	Custom	Retrofit	20%	1,284	0.000	5	$93	100%	69.1%	62.1%	3.4	20	98	16	16	0	85
168	Water Heating	NC - Process - Electric	Commercial - Existing	Custom	Retrofit	20%	200,000	10.000	8	$18,000	100%	69.1%	62.1%	5.0	0	0	0	0	0	0
169	Water Heating	Process - Electric	Commercial - Existing	Custom	Retrofit	20%	10,000	1.000	8	$1,750	69%	69.1%	62.1%	4.3	59	475	2	41	37	276
170	Interior Lighting	LED ≤20W Replacing Incandescent >90W	Commercial - NC	Prescriptive	NC	83%	310	0.064	6	$3	88%	69.1%	69.1%	62.1	1	14	1	0	0	3
171	Interior Lighting	LED ≤17W Replacing Incandescent 66-90W	Commercial - NC	Prescriptive	NC	83%	242	0.050	6	$4	98%	69.1%	69.1%	34.7	1	14	1	0	0	3
172	Interior Lighting	Delamping-T12 4ft Delamping	Commercial - NC	Prescriptive	NC	57%	73	0.024	15	$4	75%	69.1%	69.1%	33.0	13	263	15	9	73	136
173	Interior Lighting	LED 2x2 Recessed Fixture Replacing T8 2 lamp U-Tube	Commercial - NC	Prescriptive	NC	37%	97	0.020	12	$109	3%	69.1%	49.4%	29.8	38	769	43	27	95	228
174	Interior Lighting	LED ≤ 12W Replacing Incandescent 25-45W	Commercial - NC	Prescriptive	NC	85%	155	0.032	6	$3	90%	69.1%	69.1%	25.9	1	14	1	0	0	3
175	Interior Lighting	LED ≤15W Replacing Incandescent 46-65W	Commercial - NC	Prescriptive	NC	85%	202	0.042	6	$5	88%	69.1%	69.1%	25.4	1	14	1	0	0	3
176	Interior Lighting	LED 2x2 Recessed Fixture Replacing T12 2 Lamp U-Tube	Commercial - NC	Prescriptive	NC	46%	142	0.029	12	$109	7%	69.1%	49.4%	16.3	11	214	12	7	26	64
177	Interior Lighting	LED Tube Relamp Replacing T12	Commercial - NC	Prescriptive	NC	57%	85	0.018	12	$20	25%	69.1%	63.4%	15.8	13	263	15	9	42	100
178	Interior Lighting	LED Exit Sign Retrofit-Replacement	Commercial - NC	Prescriptive	NC	84%	81	0.009	16	$80	6%	69.1%	49.4%	15.4	16	310	17	11	85	145
179	Interior Lighting	LED 2x4 Recessed Fixture Replacing T8 4ft 3 Lamp or 4 Lamp	Commercial - NC	Prescriptive	NC	56%	203	0.042	14	$49	30%	69.1%	63.4%	14.1	58	1,158	64	40	257	514
180	Interior Lighting	LED Tube Relamp Replacing T8	Commercial - NC	Prescriptive	NC	46%	55	0.011	12	$20	20%	69.1%	63.4%	12.5	48	957	53	33	152	364
181	Interior Lighting	LED <10W Replacing Incandescent <25W	Commercial - NC	Prescriptive	NC	72%	67	0.010	6	$5	51%	69.1%	69.1%	11.9	1	12	1	0	0	2
182	Interior Lighting	LED Fixture Replacing T5HO 4ft 8 Lamp	Commercial - NC	Prescriptive	NC	46%	1,007	0.208	11	$85	88%	69.1%	69.1%	11.5	19	382	21	13	53	145
183	Interior Lighting	LED Tube Relamp Replacing T5HO	Commercial - NC	Prescriptive	NC	53%	88	0.016	15	$10	90%	69.1%	69.1%	10.3	22	442	24	15	122	229
184	Interior Lighting	LED Fixture Replacing T5HO 4ft 4 Lamp	Commercial - NC	Prescriptive	NC	48%	405	0.084	11	$216	16%	69.1%	57.5%	10.3	20	397	22	14	46	126
185	Interior Lighting	LED Interior Replacing HID ≤ 175W	Commercial - NC	Prescriptive	NC	81%	283	0.059	20	$86	58%	69.1%	63.4%	7.7	10	196	11	7	81	124
186	Interior Lighting	LED Fixture Replacing T5HO 4ft 6 Lamp	Commercial - NC	Prescriptive	NC	36%	431	0.089	11	$150	45%	69.1%	63.4%	5.5	15	296	16	10	38	103
187	Interior Lighting	LED Tube Relamp Replacing T5	Commercial - NC	Prescriptive	NC	18%	16	0.003	18	$10	40%	69.1%	57.5%	4.7	8	153	8	5	48	75
188	Interior Lighting	Lighting Power Density Reduction	Commercial - NC	Custom	NC	10%	4,077	0.704	15	$220	100%	69.1%	78.0%	19.1	35	707	23	25	231	431
189	Interior Lighting	Occupancy Sensor - 100W - 199W Connected Load Replacing No Existing Controls	Commercial - NC	Prescriptive	NC	30%	135	0.020	8	$42	13%	69.1%	63.4%	14.1	12	245	9	9	8	65
190	Interior Lighting	Occupancy Sensor - 501W - 1000W Connected Load Replacing No Existing Controls	Commercial - NC	Prescriptive	NC	30%	711	0.170	8	$125	44%	69.1%	69.1%	9.0	12	245	9	9	9	71
191	Interior Lighting	Occupancy Sensor - 200W - 500W Connected Load Replacing No Existing Controls	Commercial - NC	Prescriptive	NC	30%	315	0.050	8	$66	38%	69.1%	63.4%	7.4	12	245	9	9	8	65
192	Interior Lighting	Smart Web-based lighting Mgmt System	Commercial - NC	Custom	NC	35%	3	0.001	10	$1	30%	69.1%	71.6%	7.3	0	0	0	0	0	0
193	Interior Lighting	Smart Advanced Lighting Controls	Commercial - NC	Custom	NC	47%	2	0.000	10	$1	24%	69.1%	71.6%	7.2	54	1,071	38	39	121	402
194	Interior Lighting	NC - Lighting Upgrades - Interior	Commercial - NC	NC	NC	66%	138	0.030	15	$100	14%	69.1%	49.4%	11.2	2,508	50,168	2,772	1,732	9,918	18,597
195	Interior Lighting	Lighting - Interior - LED	Commercial - NC	Custom	NC	60%	220	0.010	12	$95	23%	69.1%	71.6%	6.4	0	0	0	0	0	0
196	Interior Lighting	Lighting - Interior - CFLs	Commercial - NC	Custom	NC	50%	20	0.000	12	$3	67%	69.1%	78.0%	5.5	0	0	0	0	0	0
197	Interior Lighting	Custom RCx Project - Lighting	Commercial - NC	Custom	NC	20%	20,000	4.444	5	$10,000	20%	69.1%	64.9%	4.4	233	4,663	545	341	0	1,825
198	Exterior Lighting	LED Exterior Replacing HID ≤ 175W	Commercial - NC	Prescriptive	NC	70%	593	0.000	13	$241	19%	69.1%	63.4%	7.8	10	195	8	8	45	98
199	Exterior Lighting	LED Exterior Replacing HID 176-250W	Commercial - NC	Prescriptive	NC	69%	898	0.000	13	$205	38%	69.1%	63.4%	6.8	10	192	7	7	45	97
200	Exterior Lighting	Lighting Power Density - Exterior	Commercial - NC	Custom	NC	10%	4,319	0.000	12	$220	100%	69.1%	78.0%	10.9	0	0	0	0	0	0
201	Exterior Lighting	Lighting - Exterior - LED	Commercial - NC	Custom	NC	69%	1,364	0.000	13	$100	100%	69.1%	78.0%	8.1	0	0	0	0	0	0
202	Exterior Lighting	Lighting - Exterior - T5/T8	Commercial - NC	Custom	NC	40%	250	0.000	15	$75	33%	69.1%	71.6%	6.7	0	0	0	0	0	0
203	Exterior Lighting	Lighting - Exterior - CFLs	Commercial - NC	Custom	NC	66%	50	0.000	12	$5	100%	69.1%	78.0%	5.5	0	0	0	0	0	0
204	Exterior Lighting	NC - Lighting Upgrades - Exterior	Commercial - NC	NC	NC	66%	41	0.000	15	$18	23%	69.1%	63.4%	6.7	0	0	0	0	0	0
205	Space Cooling	Water Source HP - Under 1.42 Tons (≥12 SEER) Replacing Water Source HP Under 1.42 Tons (<12 SEER)	Commercial - NC	Prescriptive	NC	13%	94	0.098	15	$50	10%	69.1%	45.8%	53.7	4	84	3	3	15	29
206	Space Cooling	Ground Source HP - <11.25 Tons (≥14.3 SEER) Replacing Ground Source HP - <11.25 Tons (<14.3 SEER)	Commercial - NC	Prescriptive	NC	22%	165	0.172	15	$50	20%	69.1%	50.5%	47.1	7	135	5	5	27	51
207	Space Cooling	Air Source HP - Between 5.4 and 11.3 Tons (≥11.5 SEER) Replacing Air Source HP Between 5.4 and 11.3 Tons (<11.5 SEER)	Commercial - NC	Prescriptive	NC	14%	96	0.100	15	$50	13%	69.1%	45.8%	43.6	4	85	3	3	15	29
208	Space Cooling	Water Source HP - Between 1.42 and 5.42 Tons (≥12.8 SEER) Replacing Water Source HP Between 1.42 and 5.42 Tons (<12.8 SEER)	Commercial - NC	Prescriptive	NC	13%	84	0.087	15	$50	11%	69.1%	45.8%	42.4	4	79	3	3	15	27
209	Space Cooling	Air Source HP - Between 11.3 and 20 Tons (≥11 SEER) Replacing Air Source HP Between 11.3 and 20 Tons (<11 SEER)	Commercial - NC	Prescriptive	NC	14%	105	0.109	15	$50	18%	69.1%	45.8%	34.3	4	88	3	3	16	30
210	Space Cooling	Water Source HP - Between 5.43 and 11.25 Tons (≥12.8 SEER) Replacing Water Source HP Between 5.43 and 11.25 Tons (<12.8 SEER)	Commercial - NC	Prescriptive	NC	13%	84	0.087	15	$50	15%	69.1%	45.8%	32.9	4	79	3	3	15	27
211	Space Cooling	PTAC - >1.25 Tons (≥14 SEER) Replacing PTAC - >1.25 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	9%	82	0.086	15	$100	8%	69.1%	39.3%	31.3	1	14	0	0	2	4
212	Space Cooling	PTAC - Between 0.58 and 1.25 Tons (≥14 SEER) Replacing PTAC - Between 0.58 and 1.25 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	10%	76	0.079	15	$100	8%	69.1%	55.0%	28.8	1	14	0	0	3	6
213	Space Cooling	PTAC - <0.58 Tons (≥14 SEER) Replacing PTAC - <0.58 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	9%	68	0.071	15	$100	8%	69.1%	29.0%	25.8	1	14	0	0	2	3
214	Space Cooling	PTHP - >1.25 Tons (≥14 SEER) Replacing PTHP - <1.25 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	9%	82	0.086	15	$50	19%	69.1%	55.0%	24.7	1	14	0	0	3	6

Appendix C: C&I Electric Measure Assumption Detail

																MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
215	Space Cooling	PTHP - Between 0.58 and 1.25 Tons (≥14 SEER) Replacing PTHP - Between 0.58 and 1.25 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	10%	76	0.079	15	$50	19%	69.1%	45.8%	22.7	1	14	0	0	3	5
216	Space Cooling	Ground Source HP - <11.25 Tons (≥17.3 SEER) Replacing Ground Source HP - <11.25 Tons (<17.3 SEER)	Commercial - NC	Prescriptive	NC	28%	133	0.138	15	$50	34%	69.1%	50.5%	22.4	9	174	6	6	35	66
217	Space Cooling	PTHP - <0.58 Tons (≥14 SEER) Replacing PTHP - <0.58 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	9%	68	0.071	15	$50	19%	69.1%	55.0%	20.4	1	14	0	0	3	6
218	Space Cooling	RTU AC - 65,000 - 135,000 BTHU (≥ 11.0 EER) Replacing RTU AC - 65,000 - 135,000 BTHU (< 11.0 EER)	Commercial - NC	Prescriptive	NC	13%	86	0.079	15	$100	12%	69.1%	39.3%	18.6	252	5,032	174	174	792	1,485
219	Space Cooling	Air Source HP - < 5.4 Tons (≥14 SEER) Replacing Air Source HP - < 5.4 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	4%	29	0.031	15	$50	10%	69.1%	29.0%	16.8	1	25	1	1	3	6
220	Space Cooling	Water Cooled Chiller	Commercial - NC	Custom	NC	13%	191	0.070	20	$178	13%	69.1%	44.4%	14.7	29	579	1	20	135	150
221	Space Cooling	Air Cooled Chiller	Commercial - NC	Custom	NC	13%	318	0.116	20	$127	30%	69.1%	57.0%	14.7	31	616	1	21	173	187
222	Space Cooling	Room AC	Commercial - NC	Custom	NC	4%	16	0.011	9	$40	5%	69.1%	32.7%	11.5	1	12	0	0	0	2
223	Space Cooling	Smart Cloud-Based Enery Information System (EIS)	Commercial - NC	Custom	NC	8%	120	0.000	10	$1	100%	69.1%	62.1%	92.9	64	1,279	2	46	125	363
224	Space Cooling	Chiller - Maintenance	Commercial - NC	Custom	NC	8%	187	0.051	5	$6	100%	69.1%	62.1%	15.8	33	662	1	24	0	107
225	Space Cooling	Advanced Rooftop Controls	Commercial - NC	Custom	NC	30%	2,474	1.938	10	$2,500	12%	69.1%	44.4%	14.0	550	10,991	18	398	780	2,334
226	Space Cooling	Windows - Install Reflective Film	Commercial - NC	Custom	NC	5%	189	0.050	10	$36	64%	69.1%	62.1%	7.3	106	2,112	20	88	247	820
227	Space Cooling	Insulation - Ceiling	Commercial - NC	Custom	NC	8%	1,021	0.000	20	$4,640	3%	69.1%	32.7%	6.9	211	4,219	174	174	2,316	3,563
228	Space Cooling	Programmable Thermostat - Electric Cooling Replacing No programmable Thermostat/Manual Thermostat	Commercial - NC	Prescriptive	NC	10%	154	0.000	8	$36	29%	69.1%	50.5%	5.7	16	324	13	13	10	82
229	Space Cooling	Programmable Thermostat - Heat Pump Replacing No programmable Thermostat/Manual Thermostat	Commercial - NC	Prescriptive	NC	10%	242	0.000	8	$36	55%	69.1%	55.0%	4.7	16	324	13	13	11	90
230	Space Cooling	Programmable Thermostat - Electric Cooling and Heat Replacing No programmable Thermostat/Manual Thermostat	Commercial - NC	Prescriptive	NC	10%	273	0.000	8	$36	64%	69.1%	55.0%	4.6	16	324	13	13	11	90
231	Space Cooling	RTU - Maintenance	Commercial - NC	Custom	NC	15%	134	0.000	3	$35	46%	69.1%	57.0%	1.2	222	4,431	8	184	0	469
232	Space Cooling	Insulation - Wall Cavity	Commercial - NC	Custom	NC	8%	252	-0.080	20	$657	5%	69.1%	32.7%	0.2	176	3,520	165	165	2,242	3,449
233	Space Cooling	HVAC - Chillers	Commercial - NC	Custom	NC	20%	877	0.160	20	$140	75%	69.1%	62.1%	10.8	197	3,933	6	136	1,409	1,656
234	Space Cooling	NC - HVAC	Commercial - NC	NC	NC	20%	465	0.150	12	$155	36%	69.1%	50.5%	9.4	0	0	0	0	0	0
235	Space Cooling	NC - Motors & Drives	Commercial - NC	NC	NC	20%	1,050	0.065	15	$120	100%	69.1%	55.0%	7.0	0	0	0	0	0	0
236	Space Cooling	Pumps & Fans	Commercial - NC	Custom	NC	20%	1,200	0.020	15	$189	76%	69.1%	62.1%	5.8	197	3,933	6	136	886	1,259
237	Space Cooling	NC - EMS - Electric	Commercial - NC	NC	NC	20%	1,053	0.000	10	$325	39%	69.1%	50.5%	4.0	0	0	0	0	0	0
238	Space Cooling	NC - Whole Building Design - Electric	Commercial - NC	NC	NC	20%	20,000	0.000	10	$4,000	60%	69.1%	55.0%	4.0	0	0	0	0	0	0
239	Space Cooling	Custom RCx Project - EMS	Commercial - NC	Custom	NC	20%	30,000	5.556	5	$4,800	75%	69.1%	62.1%	3.4	197	3,933	6	136	0	609
240	Space Heating	Air Source HP - < 5.4 Tons (≥14 SEER) Replacing Air Source HP - < 5.4 Tons (<14 SEER)	Commercial - NC	Prescriptive	NC	4%	74	0.000	15	$50	10%	69.1%	39.3%	9.9	0	8	0	0	1	2
241	Space Heating	Ground Source HP - <11.25 Tons (≥14.3 SEER) Replacing Ground Source HP - <11.25 Tons (<14.3 SEER)	Commercial - NC	Prescriptive	NC	14%	186	0.000	15	$50	46%	69.1%	50.5%	5.4	1	29	1	1	6	11
242	Space Heating	ECM on Furnace Replacing Furnace with No ECM	Commercial - NC	Prescriptive	NC	65%	720	0.000	20	$250	46%	69.1%	50.5%	5.2	200	4,010	138	138	1,315	2,023
243	Space Heating	Ground Source HP - <11.25 Tons (≥17.3 SEER) Replacing Ground Source HP - <11.25 Tons (<17.3 SEER)	Commercial - NC	Prescriptive	NC	14%	168	0.000	15	$50	46%	69.1%	50.5%	4.9	0	0	0	0	0	0
244	Space Heating	Air Source HP - Between 5.4 and 11.3 Tons (≥11.5 SEER) Replacing Air Source HP Between 5.4 and 11.3 Tons (<11.5 SEER)	Commercial - NC	Prescriptive	NC	3%	40	0.000	15	$50	13%	69.1%	39.3%	4.2	0	6	0	0	1	2
245	Space Heating	Air Source HP - Between 11.3 and 20 Tons (≥11 SEER) Replacing Air Source HP Between 11.3 and 20 Tons (<11 SEER)	Commercial - NC	Prescriptive	NC	3%	42	0.000	15	$50	18%	69.1%	39.3%	3.2	0	6	0	0	1	2
246	Space Heating	Water Source HP - Under 1.42 Tons (≥12 SEER) Replacing Water Source HP Under 1.42 Tons (<12 SEER)	Commercial - NC	Prescriptive	NC	2%	23	0.000	15	$50	10%	69.1%	29.0%	3.1	0	5	0	0	1	1
247	Space Heating	PTHP - to 0.58 Tons 14+ SEER	Commercial - NC	Prescriptive	NC	8%	106	0.000	15	$50	46%	69.1%	50.5%	3.1	1	16	1	1	3	6
248	Space Heating	Water Source HP - Between 1.42 and 5.42 Tons (≥12.8 SEER) Replacing Water Source HP Between 1.42 and 5.42 Tons (<12.8 SEER)	Commercial - NC	Prescriptive	NC	2%	23	0.000	15	$50	11%	69.1%	29.0%	2.8	0	5	0	0	1	1
249	Space Heating	PTHP - 1.25+ Tons 14+ SEER	Commercial - NC	Prescriptive	NC	7%	95	0.000	15	$50	46%	69.1%	50.5%	2.8	1	14	0	0	3	5
250	Space Heating	PTHP - 0.58 - 1.25 Tons 14 SEER	Commercial - NC	Prescriptive	NC	5%	79	0.000	15	$50	46%	69.1%	50.5%	2.3	1	11	0	0	2	4
251	Space Heating	Water Source HP - Between 5.43 and 11.25 Tons (≥12.8 SEER) Replacing Water Source HP Between 5.43 and 11.25 Tons (<12.8 SEER)	Commercial - NC	Prescriptive	NC	2%	23	0.000	15	$50	15%	69.1%	29.0%	2.2	0	5	0	0	1	1
252	Space Heating	Space Heating - Heat Recovery Ventilator	Commercial - NC	Custom	NC	30%	2	0.003	15	$6	3%	69.1%	32.7%	36.1	0	0	0	0	0	0
253	Space Heating	Electric Zonal Heat	Commercial - NC	Custom	NC	10%	286	0.000	15	$15	100%	69.1%	62.1%	12.7	0	0	0	0	0	0
254	Space Heating	Insulation - Ceiling	Commercial - NC	Custom	NC	8%	1,590	0.000	20	$6,960	3%	69.1%	32.7%	6.9	21	426	2	17	115	157
255	Space Heating	Insulation - Wall Cavity	Commercial - NC	Custom	NC	2%	1,173	0.000	20	$2,629	5%	69.1%	32.7%	6.9	5	100	0	4	28	39
256	Space Heating	Custom RCx Project - HVAC	Commercial - NC	Custom	NC	20%	30,000	0.000	5	$10,000	36%	69.1%	57.0%	2.1	28	561	1	19	0	80
257	Ventilation	Insulation - Ducting	Commercial - NC	Custom	NC	20%	61	0.004	20	$66	11%	69.1%	44.4%	8.2	896	17,929	208	619	5,178	7,767
258	Ventilation	HVAC - Duct Repair and Sealing	Commercial - NC	Custom	NC	23%	70	0.000	18	$108	8%	69.1%	32.7%	6.4	993	19,860	230	686	4,533	7,418
259	Ventilation	NC - Elec - Other Systems	Commercial - NC	NC	NC	20%	2,290	0.020	10	$205	100%	69.1%	55.0%	5.4	505	10,095	456	456	1,205	4,016
260	Cooking	ENERGY STAR Steamer - 3 Pan Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	57%	5,018	1.351	12	$3,500	11%	69.1%	39.3%	13.0	46	920	25	32	115	276
261	Cooking	ENERGY STAR Holding Cabinet -- 1/2 Size -- ENERGY STAR Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	58%	1,788	0.330	12	$1,783	7%	69.1%	39.3%	12.9	5	107	1	4	10	25
262	Cooking	ENERGY STAR Steamer - 6 Pan Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	57%	10,353	2.787	12	$3,500	25%	69.1%	50.5%	12.2	28	564	15	19	71	171
263	Cooking	ENERGY STAR Steamer - 5 Pan Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	57%	8,727	2.350	12	$3,500	21%	69.1%	50.5%	12.0	28	564	15	19	71	171
264	Cooking	ENERGY STAR Griddle Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	12%	7,147	1.924	12	$2,090	30%	69.1%	50.5%	11.8	1	22	0	1	3	7
265	Cooking	Holding Cabinets - Insulated - FA2 Full Size -ENERGY STAR Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	69%	5,278	0.960	12	$1,783	25%	69.1%	50.5%	10.6	1	24	1	1	3	7
266	Cooking	ENERGY STAR Oven - Combo Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	48%	18,432	3.530	12	$2,150	73%	69.1%	55.0%	10.6	4	87	3	3	13	31
267	Cooking	ENERGY STAR Oven - Convection Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	27%	3,235	0.620	12	$1,113	25%	69.1%	50.5%	10.5	41	825	24	28	122	292
268	Cooking	ENERGY STAR Fryer Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	17%	983	0.220	12	$500	18%	69.1%	45.8%	10.4	2	31	0	1	4	8
269	Cooking	ENERGY STAR Steamer - 4 Pan Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	57%	6,416	1.727	12	$3,500	19%	69.1%	45.8%	9.8	1	19	1	1	2	6
270	Behavioral	SEM	Commercial - NC	Custom	NC	3%	1	0.000	5	$0	45%	69.1%	57.0%	2.8	81	1,611	39	88	0	388
271	Behavioral	Whole-Building Energy Monitoring	Commercial - NC	Custom	NC	2%	1	0.000	3	$0	27%	69.1%	57.0%	1.8	40	805	20	44	0	116
272	Behavioral	Building Operator Certification	Commercial - NC	Custom	NC	1%	190	0.021	3	$32	71%	69.1%	62.1%	1.7	17	344	8	19	0	54
273	Behavioral	Behavior Based Efficiency (Commercial Energy Reports)	Commercial - NC	Custom	NC	0%	1	0.000	2	$0	100%	69.1%	62.1%	0.5	0	0	0	0	0	0
274	Office Equipment	POS Terminal	Commercial - NC	Custom	NC	68%	121	0.011	6	$1	100%	69.1%	62.1%	63.0	149	2,984	5	103	0	538
275	Office Equipment	Printer/Copier/Fax	Commercial - NC	Custom	NC	40%	223	0.021	6	$4	100%	69.1%	62.1%	20.9	203	4,054	201	201	0	1,204
276	Office Equipment	Computer Room Air Side Economizer	Commercial - NC	Custom	NC	47%	440	0.000	10	$25	100%	69.1%	62.1%	8.4	108	2,150	3	74	200	618
277	Office Equipment	VFD for Process Fans -CRAC units	Commercial - NC	Custom	NC	43%	2,279	0.000	15	$200	100%	69.1%	62.1%	7.6	98	1,965	3	68	468	722
278	Office Equipment	Computer Room Air Conditioner Economizer	Commercial - NC	Custom	NC	47%	358	0.000	15	$82	52%	69.1%	62.1%	5.6	108	2,150	3	74	513	790
279	Office Equipment	Computer Room Hot Aisle Cold Aisle Configuration	Commercial - NC	Custom	NC	13%	125	0.000	15	$156	10%	69.1%	44.4%	5.6	30	597	1	21	104	166
280	Office Equipment	Electrically Commutated Plug Fans in data centers	Commercial - NC	Custom	NC	33%	1,445	0.000	15	$718	24%	69.1%	51.7%	5.6	77	1,537	2	53	310	496
281	Office Equipment	High Efficiency CRAC unit	Commercial - NC	Custom	NC	30%	162	0.000	15	$63	31%	69.1%	57.0%	5.6	69	1,377	2	48	306	490
282	Office Equipment	Laptop	Commercial - NC	Custom	NC	32%	40	0.004	6	$6	83%	69.1%	62.1%	3.2	233	4,655	209	209	0	1,257
283	Office Equipment	Monitor	Commercial - NC	Custom	NC	21%	15	0.001	6	$12	15%	69.1%	44.4%	3.2	126	2,522	119	119	0	711

Appendix C: C&I Electric Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
284	Office Equipment	Desktop Computer	Commercial - NC	Custom	NC	43%	81	0.000	4	$5	100%	69.1%	62.1%	3.2	312	6,236	122	215	0	774
285	Office Equipment	Server	Commercial - NC	Custom	NC	43%	81	0.000	4	$5	100%	69.1%	62.1%	3.2	99	1,976	3	68	0	244
286	Office Equipment	Office Equipment - Plug Load Occupancy Sensors	Commercial - NC	Custom	NC	15%	169	0.000	8	$70	29%	69.1%	57.0%	3.2	132	2,642	6	129	108	811
287	Office Equipment	Office Equipment - Smart Plug Load Sensors	Commercial - NC	Custom	NC	15%	23	0.000	8	$15	19%	69.1%	51.7%	3.2	132	2,642	6	129	98	735
288	Other	Compressed Air - Engineered Nozzle -- per shift -- .25'' nozzle	Commercial - NC	Custom	NC	42%	1,349	0.511	15	$14	100%	69.1%	62.1%	140.8	0	0	0	0	0	0
289	Other	Compressed Air - Engineered Nozzle -- per shift -- .125'' nozzle	Commercial - NC	Custom	NC	42%	430	0.163	15	$14	100%	69.1%	62.1%	44.9	0	0	0	0	0	0
290	Other	Transformer - High Efficiency	Commercial - NC	Custom	NC	2%	552	0.057	30	$810	8%	69.1%	32.7%	11.8	0	0	0	0	0	0
291	Other	VFD on Pool Pump	Commercial - NC	Custom	NC	20%	1,425	0.254	12	$200	86%	69.1%	62.1%	7.3	0	0	0	0	0	0
292	Other	Compressed Air Audits and Leak Repair	Commercial - NC	Custom	NC	50%	496	0.079	1	$8	100%	69.1%	62.1%	4.8	0	0	0	0	0	0
293	Other	Motors - Variable Frequency Drive (Compressed Air)	Commercial - NC	Custom	NC	17%	104,220	4.680	10	$27,160	46%	69.1%	57.0%	4.5	0	0	0	0	0	0
294	Other	NC - Envelope	Commercial - NC	NC	NC	20%	30,000	2.000	20	$18,000	20%	69.1%	45.8%	8.4	185	3,707	128	128	1,102	1,696
295	Other	NC - Compressed Air	Commercial - NC	NC	NC	20%	1,336	0.175	15	$300	53%	69.1%	55.0%	7.8	927	18,533	640	640	4,074	7,639
296	Other	NC - Pumps/Fans/VFDs	Commercial - NC	NC	NC	20%	1,615	0.100	15	$364	53%	69.1%	55.0%	6.6	741	14,827	512	512	3,259	6,111
297	Other	EMS/Controls - Electric	Commercial - NC	Custom	NC	20%	1,550	0.100	10	$200	93%	69.1%	62.1%	4.8	0	0	0	0	0	0
298	Other	Other - Electric	Commercial - NC	Custom	NC	20%	7,300	0.300	10	$1,150	76%	69.1%	62.1%	4.5	0	0	0	0	0	0
299	Other	Custom RCx Project - Other	Commercial - NC	Custom	NC	20%	50,000	11.111	5	$8,000	75%	69.1%	62.1%	3.6	0	0	0	0	0	0
300	Other	Custom RCx Project - Process	Commercial - NC	Custom	NC	20%	50,000	9.259	5	$8,000	75%	69.1%	62.1%	3.4	0	0	0	0	0	0
301	Refrigeration	ECM Cooler Motors Replacing Cooler Shaded Pole or PSC Motors	Commercial - NC	Prescriptive	NC	52%	1,365	0.140	15	$226	14%	69.1%	50.5%	38.5	213	4,267	143	147	1,024	1,920
302	Refrigeration	LED Refrigerated Display Case Lighting	Commercial - NC	Prescriptive	NC	45%	438	0.650	8	$150	29%	69.1%	50.5%	22.8	78	1,564	37	54	39	316
303	Refrigeration	ECM Freezer Motors Replacing Freezer Shaded Pole or PSC Motors	Commercial - NC	Prescriptive	NC	52%	1,365	0.140	15	$226	24%	69.1%	50.5%	21.9	59	1,185	40	41	285	533
304	Refrigeration	ENERGY STAR Ice Machine - 500-1000 lb/Day Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	14%	1,188	0.117	9	$1,485	3%	69.1%	29.0%	13.6	24	486	17	17	31	138
305	Refrigeration	ENERGY STAR Ice Machine - ≥1000 lb/Day Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	20%	1,525	0.146	9	$1,821	4%	69.1%	39.3%	13.3	35	695	24	24	44	197
306	Refrigeration	LED Freezer Display Case Lighting	Commercial - NC	Prescriptive	NC	45%	472	0.070	8	$150	32%	69.1%	50.5%	5.7	22	443	10	15	11	89
307	Refrigeration	Refrigerator - High Efficiency Compressor	Commercial - NC	Custom	NC	1%	875	0.000	13	$552	19%	69.1%	51.7%	4.9	7	143	4	5	26	56
308	Refrigeration	ENERGY STAR Commercial Refrigerator 30- 50ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	26%	393	0.045	12	$750	9%	69.1%	29.0%	4.6	57	1,140	34	39	125	301
309	Refrigeration	ENERGY STAR Commercial Freezer 15-30 ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	21%	613	0.070	12	$400	26%	69.1%	45.8%	4.4	16	318	9	11	36	87
310	Refrigeration	ENERGY STAR Commercial Refrigerator 15-30ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	28%	287	0.033	12	$500	10%	69.1%	29.0%	4.4	60	1,209	36	42	133	319
311	Refrigeration	Motion Sensors on LED cases Replacing No Controls	Commercial - NC	Prescriptive	NC	45%	133	0.000	8	$26	52%	69.1%	55.0%	3.8	100	2,007	47	69	55	441
312	Refrigeration	ENERGY STAR Commercial Refrigerator ≥50ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	24%	501	0.057	12	$900	11%	69.1%	29.0%	3.8	52	1,037	31	36	114	274
313	Refrigeration	ENERGY STAR Commercial Freezer <15ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	19%	320	0.037	12	$150	50%	69.1%	50.5%	3.2	14	280	8	10	35	85
314	Refrigeration	ENERGY STAR Commercial Refrigerator <15ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	30%	208	0.024	12	$250	22%	69.1%	39.3%	2.9	66	1,329	39	46	146	351
315	Refrigeration	Evaporator Fan Controls Installed on Shade Pole or PSC Replacing No Controls	Commercial - NC	Custom	NC	25%	796	0.082	5	$421	23%	69.1%	51.7%	2.8	108	2,167	48	84	0	320
316	Refrigeration	ENERGY STAR Commercial Freezer 30-50 ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	18%	802	0.092	12	$550	47%	69.1%	45.8%	2.3	13	268	8	9	31	74
317	Refrigeration	ENERGY STAR Commercial Freezer >50ft³ Replacing Non-ENERGY STAR Model	Commercial - NC	Prescriptive	NC	17%	1,112	0.127	12	$700	59%	69.1%	50.5%	2.0	13	253	7	9	32	77
318	Refrigeration	Refrigerator - Floating Head Pressure	Commercial - NC	Custom	NC	9%	1,264	0.000	15	$80	100%	69.1%	62.1%	10.5	76	1,512	3	58	408	629
319	Refrigeration	Auto Door Closers - Walk-In Freezer Replacing Door with manual closer	Commercial - NC	Custom	NC	15%	2,307	0.309	8	$157	100%	69.1%	62.1%	8.2	9	178	2	7	6	51
320	Refrigeration	Anti-Sweat Heater Controls - Cooler Replacing No Controls	Commercial - NC	Prescriptive	NC	55%	541	0.000	12	$250	15%	69.1%	45.8%	8.1	49	984	26	38	128	307
321	Refrigeration	Anti-Sweat Heater Controls - Freezer Replacing No Controls	Commercial - NC	Prescriptive	NC	55%	1,278	0.000	12	$250	44%	69.1%	55.0%	6.4	61	1,228	32	47	189	454
322	Refrigeration	Auto Door Closers - Walk-In cooler Replacing Door with manual closer	Commercial - NC	Custom	NC	15%	943	0.137	8	$157	72%	69.1%	62.1%	4.8	26	520	7	20	18	147
323	Refrigeration	Strip Curtain - Walk-In Freezer Replacing No Cover	Commercial - NC	Custom	NC	80%	2,974	0.339	6	$256	100%	69.1%	62.1%	4.8	47	948	12	37	0	203
324	Refrigeration	Strip Curtain - Walk-In Cooler Replacing No Cover	Commercial - NC	Custom	NC	80%	422	0.048	6	$256	20%	69.1%	51.7%	3.4	139	2,775	36	108	0	491
325	Refrigeration	Vending Machine Occupancy Sensor - Refrigerated Beverage Replacing No control	Commercial - NC	Custom	NC	46%	1,612	0.000	5	$216	90%	69.1%	62.1%	2.1	95	1,901	22	66	0	295
326	Refrigeration	Vending Machine Occupancy Sensor - Refrigerated Glass Front Cooler Replacing No control	Commercial - NC	Custom	NC	30%	1,209	0.000	5	$216	67%	69.1%	62.1%	2.1	62	1,240	14	43	0	192
327	Refrigeration	NC - Refrigeration	Commercial - NC	NC	NC	20%	75,000	13.889	12	$35,000	26%	69.1%	50.5%	7.4	228	4,561	157	157	575	1,381
328	Refrigeration	Refrigeration	Commercial - NC	Custom	NC	20%	3,510	0.350	12	$555	76%	69.1%	62.1%	6.1	228	4,561	7	157	701	1,493
329	Refrigeration	Custom RCx Project - Refrigeration	Commercial - NC	Custom	NC	20%	30,000	5.556	5	$10,000	36%	69.1%	57.0%	3.4	228	4,561	24	157	0	650
330	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - High Temp /Elec Heat Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	38%	27,408	4.170	20	$970	72%	69.1%	55.0%	47.8	1	18	1	1	8	12
331	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - Low Temp /Elec Heat Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	38%	18,811	2.860	20	$970	62%	69.1%	55.0%	38.3	1	18	1	1	8	12
332	Water Heating	ENERGY STAR Dishwasher - Single Tank Conv - High Temp / Elect Heat Replacing Non-ENERGY STAR model	Commercial - NC	Prescriptive	NC	20%	9,212	1.400	20	$2,050	46%	69.1%	55.0%	11.8	0	10	0	0	4	6
333	Water Heating	Energy Star Clothes Washer	Commercial - NC	Custom	NC	31%	485	0.324	7	$63	93%	69.1%	62.1%	9.2	5	108	1	4	0	24
334	Water Heating	Heat Pump Water Heater	Commercial - NC	Custom	NC	59%	2,124	0.000	10	$433	59%	69.1%	62.1%	4.0	29	586	1	20	54	163
335	Water Heating	Water Heater - Faucet Aerators/Low Flow Nozzles	Commercial - NC	Custom	NC	33%	848	0.097	10	$3	100%	69.1%	62.1%	220.5	6	122	0	5	14	42
336	Water Heating	Pre-rinse Spray Valves	Commercial - NC	Custom	NC	20%	1,284	0.000	5	$93	100%	69.1%	62.1%	3.4	4	75	3	3	0	16
337	Water Heating	NC - Process - Electric	Commercial - NC	NC	NC	20%	200,000	10.000	8	$18,000	100%	69.1%	55.0%	5.0	15	298	10	10	8	66
338	Water Heating	Process - Electric	Commercial - NC	Custom	NC	20%	10,000	1.000	8	$1,750	69%	69.1%	62.1%	4.3	0	0	0	0	0	0
339	Interior Lighting	LED ≤20W Replacing Incandescent >90W	Commercial - SBDI	SBDI	Retrofit	83%	310	0.064	6	$3	100%	69.1%	57.3%	54.5	9	0	10	0	0	0
340	Interior Lighting	LED ≤17W Replacing Incandescent 66-90W	Commercial - SBDI	SBDI	Retrofit	83%	242	0.050	6	$4	100%	69.1%	57.3%	34.1	9	0	10	0	0	0
341	Interior Lighting	Delamping-T12 4ft Delamping	Commercial - SBDI	Prescriptive	Retrofit	57%	73	0.024	15	$4	75%	69.1%	69.1%	33.0	310	0	342	0	0	0
342	Interior Lighting	LED 2x2 Recessed Fixture Replacing T8 2 lamp U-Tube	Commercial - SBDI	Prescriptive	Retrofit	37%	97	0.020	12	$109	3%	69.1%	49.4%	29.8	906	0	1,001	0	0	0
343	Interior Lighting	LED ≤ 12W Replacing Incandescent 25-45W	Commercial - SBDI	SBDI	Retrofit	85%	155	0.032	6	$3	100%	69.1%	57.3%	23.3	9	0	10	0	0	0
344	Interior Lighting	LED ≤15W Replacing Incandescent 46-65W	Commercial - SBDI	SBDI	Retrofit	85%	202	0.042	6	$5	100%	69.1%	57.3%	22.2	9	0	10	0	0	0
345	Interior Lighting	LED 2x2 Recessed Fixture Replacing T12 2 Lamp U-Tube	Commercial - SBDI	Prescriptive	Retrofit	46%	142	0.029	12	$109	7%	69.1%	49.4%	16.3	252	0	279	0	0	0
346	Interior Lighting	LED Tube Relamp Replacing T12	Commercial - SBDI	Prescriptive	Retrofit	57%	85	0.018	12	$20	25%	69.1%	63.4%	15.8	310	0	343	0	0	0
347	Interior Lighting	LED 2x4 Recessed Fixture Replacing T8 4ft 3 Lamp or 4 Lamp	Commercial - SBDI	Prescriptive	Retrofit	56%	203	0.042	14	$49	30%	69.1%	63.4%	14.1	1,363	0	1,506	0	0	0
348	Interior Lighting	LED Tube Relamp Replacing T8	Commercial - SBDI	Prescriptive	Retrofit	46%	55	0.011	12	$20	20%	69.1%	63.4%	12.5	1,127	0	1,245	0	0	0
349	Interior Lighting	LED <10W Replacing Incandescent <25W	Commercial - SBDI	SBDI	Retrofit	72%	67	0.010	6	$5	51%	69.1%	57.3%	11.9	8	0	9	0	0	0
350	Interior Lighting	LED Fixture Replacing T5HO 4ft 8 Lamp	Commercial - SBDI	Prescriptive	Retrofit	46%	1,007	0.208	11	$85	88%	69.1%	69.1%	11.5	1,125	0	1,243	0	0	0
351	Interior Lighting	LED Tube Relamp Replacing T5HO	Commercial - SBDI	Prescriptive	Retrofit	53%	88	0.016	15	$10	90%	69.1%	69.1%	10.3	1,302	0	1,438	0	0	0
352	Interior Lighting	LED Fixture Replacing T5HO 4ft 4 Lamp	Commercial - SBDI	Prescriptive	Retrofit	48%	405	0.084	11	$216	16%	69.1%	57.5%	10.3	1,168	0	1,291	0	0	0
353	Interior Lighting	LED Interior Replacing HID ≤ 175W	Commercial - SBDI	SBDI	Retrofit	81%	283	0.059	20	$86	72%	69.1%	57.3%	6.2	330	1,652	365	0	0	1,001
354	Interior Lighting	LED Fixture Replacing T5HO 4ft 6 Lamp	Commercial - SBDI	Prescriptive	Retrofit	36%	431	0.089	11	$150	45%	69.1%	63.4%	5.5	872	0	963	0	0	0
355	Interior Lighting	LED Tube Relamp Replacing T5	Commercial - SBDI	Prescriptive	Retrofit	18%	16	0.003	18	$10	40%	69.1%	57.5%	4.7	449	1,348	497	0	0	543
356	Interior Lighting	LED Exit Sign Retrofit-Replacement	Commercial - SBDI	SBDI	Retrofit	84%	81	0.009	16	$80	50%	69.1%	47.7%	1.9	210	210	232	0	0	51
357	Interior Lighting	Lighting Power Density Reduction	Commercial - SBDI	Custom	Retrofit	10%	4,077	0.704	15	$220	100%	69.1%	78.0%	19.1	793	11,891	675	742	6,716	12,555
358	Interior Lighting	Occupancy Sensor - 100W - 199W Connected Load Replacing No Existing Controls	Commercial - SBDI	SBDI	Retrofit	30%	135	0.020	8	$42	15%	69.1%	52.6%	12.0	389	3,115	376	376	284	2,273
359	Interior Lighting	Smart Web-based lighting Mgmt System	Commercial - SBDI	Custom	Retrofit	35%	3	0.001	10	$1	30%	69.1%	71.6%	7.3	0	0	0	0	0	0

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															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
360	Interior Lighting	Smart Advanced Lighting Controls	Commercial - SBDI	Custom	Retrofit	47%	2	0.000	10	$1	24%	69.1%	71.6%	7.2	2,719	27,185	2,552	2,623	8,105	27,018
361	Interior Lighting	Occupancy Sensor - 501W - 1000W Connected Load Replacing No Existing Controls	Commercial - SBDI	SBDI	Retrofit	30%	711	0.170	8	$125	60%	69.1%	57.3%	6.6	389	3,115	376	376	309	2,476
362	Interior Lighting	Occupancy Sensor - 200W - 500W Connected Load Replacing No Existing Controls	Commercial - SBDI	SBDI	Retrofit	30%	315	0.050	8	$66	61%	69.1%	57.3%	4.6	389	3,115	376	376	309	2,476
363	Interior Lighting	NC - Lighting Upgrades - Interior	Commercial - SBDI	Custom	Retrofit	66%	138	0.030	15	$100	14%	69.1%	55.8%	11.2	0	0	0	0	0	0
364	Interior Lighting	Lighting - Interior - LED	Commercial - SBDI	Custom	Retrofit	60%	220	0.010	12	$95	23%	69.1%	71.6%	6.4	0	0	0	0	0	0
365	Interior Lighting	Lighting - Interior - CFLs	Commercial - SBDI	Custom	Retrofit	50%	20	0.000	12	$3	67%	69.1%	78.0%	5.5	0	0	0	0	0	0
366	Interior Lighting	Custom RCx Project - Lighting	Commercial - SBDI	Custom	Retrofit	20%	20,000	4.444	5	$10,000	20%	69.1%	64.9%	4.4	805	0	1,411	0	0	0
367	Exterior Lighting	LED Exterior Replacing HID ≤ 175W	Commercial - SBDI	SBDI	Retrofit	70%	593	0.000	13	$241	26%	69.1%	52.6%	5.7	72	937	56	56	336	727
368	Exterior Lighting	LED Exterior Replacing HID 176-250W	Commercial - SBDI	SBDI	Retrofit	69%	898	0.000	13	$205	49%	69.1%	57.3%	5.3	71	922	55	55	330	715
369	Exterior Lighting	Lighting Power Density - Exterior	Commercial - SBDI	Custom	Retrofit	10%	4,319	0.000	12	$220	100%	69.1%	78.0%	10.9	0	0	0	0	0	0
370	Exterior Lighting	Lighting - Exterior - LED	Commercial - SBDI	Custom	Retrofit	69%	1,364	0.000	13	$100	100%	69.1%	78.0%	8.1	0	0	0	0	0	0
371	Exterior Lighting	Lighting - Exterior - T5/T8	Commercial - SBDI	Custom	Retrofit	40%	250	0.000	15	$75	33%	69.1%	71.6%	6.7	0	0	0	0	0	0
372	Exterior Lighting	Lighting - Exterior - CFLs	Commercial - SBDI	Custom	Retrofit	66%	50	0.000	12	$5	100%	69.1%	78.0%	5.5	0	0	0	0	0	0
373	Exterior Lighting	NC - Lighting Upgrades - Exterior	Commercial - SBDI	Custom	Retrofit	66%	41	0.000	15	$18	23%	69.1%	71.6%	6.7	0	0	0	0	0	0
374	Space Cooling	Water Source HP - Under 1.42 Tons (≥12 SEER) Replacing Water Source HP Under 1.42 Tons (<12 SEER)	Commercial - SBDI	Prescriptive	ROB	13%	94	0.098	15	$50	10%	69.1%	45.8%	53.7	11	165	8	8	40	76
375	Space Cooling	Ground Source HP - <11.25 Tons (≥14.3 SEER) Replacing Ground Source HP - <11.25 Tons (<14.3 SEER)	Commercial - SBDI	Prescriptive	ROB	22%	165	0.172	15	$50	19%	69.1%	50.5%	49.5	18	266	12	12	71	134
376	Space Cooling	Air Source HP - Between 5.4 and 11.3 Tons (≥11.5 SEER) Replacing Air Source HP Between 5.4 and 11.3 Tons (<11.5 SEER)	Commercial - SBDI	Prescriptive	ROB	14%	96	0.100	15	$50	13%	69.1%	45.8%	43.6	11	166	8	8	41	76
377	Space Cooling	Water Source HP - Between 1.42 and 5.42 Tons (≥12.8 SEER) Replacing Water Source HP Between 1.42 and 5.42 Tons (<12.8 SEER)	Commercial - SBDI	Prescriptive	ROB	13%	84	0.087	15	$50	11%	69.1%	45.8%	42.4	10	156	7	7	38	71
378	Space Cooling	Ground Source HP - <11.25 Tons (≥17.3 SEER) Replacing Ground Source HP - <11.25 Tons (<17.3 SEER)	Commercial - SBDI	Prescriptive	ROB	28%	133	0.138	15	$50	19%	69.1%	50.5%	39.8	23	343	16	16	92	173
379	Space Cooling	Air Source HP - Between 11.3 and 20 Tons (≥11 SEER) Replacing Air Source HP Between 11.3 and 20 Tons (<11 SEER)	Commercial - SBDI	Prescriptive	ROB	14%	105	0.109	15	$50	18%	69.1%	45.8%	34.3	12	174	8	8	42	79
380	Space Cooling	Water Source HP - Between 5.43 and 11.25 Tons (≥12.8 SEER) Replacing Water Source HP Between 5.43 and 11.25 Tons (<12.8 SEER)	Commercial - SBDI	Prescriptive	ROB	13%	84	0.087	15	$50	15%	69.1%	45.8%	32.9	10	156	7	7	38	71
381	Space Cooling	PTAC - >1.25 Tons (≥14 SEER) Replacing PTAC - >1.25 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	9%	82	0.086	15	$100	8%	69.1%	39.3%	31.3	2	27	1	1	6	11
382	Space Cooling	PTAC - Between 0.58 and 1.25 Tons (≥14 SEER) Replacing PTAC - Between 0.58 and 1.25 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	10%	76	0.079	15	$100	8%	69.1%	29.0%	28.8	2	28	1	1	4	8
383	Space Cooling	PTAC - <0.58 Tons (≥14 SEER) Replacing PTAC - <0.58 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	9%	68	0.071	15	$100	8%	69.1%	29.0%	25.8	2	28	1	1	4	8
384	Space Cooling	PTHP - >1.25 Tons (≥14 SEER) Replacing PTHP - <1.25 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	9%	82	0.086	15	$50	19%	69.1%	45.8%	24.7	2	27	1	1	7	12
385	Space Cooling	PTHP - Between 0.58 and 1.25 Tons (≥14 SEER) Replacing PTHP - Between 0.58 and 1.25 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	10%	76	0.079	15	$50	19%	69.1%	45.8%	22.7	2	28	1	1	7	13
386	Space Cooling	PTHP - <0.58 Tons (≥14 SEER) Replacing PTHP - <0.58 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	9%	68	0.071	15	$50	19%	69.1%	45.8%	20.4	2	28	1	1	7	13
387	Space Cooling	RTU AC - 65,000 - 135,000 BTHU (≥ 11.0 EER) Replacing RTU AC - 65,000 - 135,000 BTHU (< 11.0 EER)	Commercial - SBDI	Prescriptive	Retrofit	13%	86	0.079	15	$100	12%	69.1%	39.3%	18.6	632	9,481	436	436	1,989	3,729
388	Space Cooling	Air Source HP - < 5.4 Tons (≥14 SEER) Replacing Air Source HP - < 5.4 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	4%	29	0.031	15	$50	10%	69.1%	29.0%	16.8	3	50	2	2	8	14
389	Space Cooling	Water Cooled Chiller	Commercial - SBDI	Custom	ROB	13%	191	0.070	20	$178	13%	69.1%	44.4%	14.7	56	1,117	2	39	296	359
390	Space Cooling	Air Cooled Chiller	Commercial - SBDI	Custom	ROB	13%	318	0.116	20	$127	30%	69.1%	57.0%	14.7	59	1,187	2	41	391	459
391	Space Cooling	Room AC	Commercial - SBDI	Custom	ROB	4%	16	0.011	9	$40	5%	69.1%	32.7%	11.5	3	24	0	2	2	7
392	Space Cooling	Smart Cloud-Based Enery Information System (EIS)	Commercial - SBDI	Custom	Retrofit	8%	120	0.000	10	$1	100%	69.1%	62.1%	92.9	254	2,537	8	181	491	1,419
393	Space Cooling	Chiller - Maintenance	Commercial - SBDI	Custom	Retrofit	8%	187	0.051	5	$6	100%	69.1%	62.1%	15.8	263	1,314	8	188	0	834
394	Space Cooling	Advanced Rooftop Controls	Commercial - SBDI	Custom	Retrofit	30%	2,474	1.938	10	$2,500	12%	69.1%	44.4%	14.0	2,179	21,792	70	1,552	3,049	9,129
395	Space Cooling	Windows - Install Reflective Film	Commercial - SBDI	Custom	Retrofit	5%	189	0.050	10	$36	64%	69.1%	62.1%	7.3	281	2,807	49	213	617	2,049
396	Space Cooling	Insulation - Ceiling	Commercial - SBDI	Custom	Retrofit	8%	1,021	0.000	20	$4,640	3%	69.1%	32.7%	6.9	97	1,944	79	79	1,047	1,611
397	Space Cooling	Programmable Thermostat - Electric Cooling Replacing No programmable Thermostat/Manual Thermostat	Commercial - SBDI	SBDI	Retrofit	10%	154	0.000	8	$36	39%	69.1%	41.9%	4.3	84	669	64	64	41	331
398	Space Cooling	Programmable Thermostat - Heat Pump Replacing No programmable Thermostat/Manual Thermostat	Commercial - SBDI	SBDI	Retrofit	10%	242	0.000	8	$36	69%	69.1%	45.6%	3.8	84	669	64	64	45	360
399	Space Cooling	Programmable Thermostat - Electric Cooling and Heat Replacing No programmable Thermostat/Manual Thermostat	Commercial - SBDI	SBDI	Retrofit	10%	273	0.000	8	$36	86%	69.1%	45.6%	3.4	84	669	64	64	45	360
400	Space Cooling	RTU - Maintenance	Commercial - SBDI	Custom	Retrofit	15%	134	0.000	3	$35	46%	69.1%	57.0%	1.2	2,961	8,882	101	2,248	0	5,887
401	Space Cooling	Insulation - Wall Cavity	Commercial - SBDI	Custom	Retrofit	8%	252	-0.080	20	$657	5%	69.1%	32.7%	0.2	82	1,638	70	70	980	1,508
402	Space Cooling	HVAC - Chillers	Commercial - SBDI	Custom	ROB	20%	877	0.160	20	$140	75%	69.1%	62.1%	10.8	379	7,586	12	262	2,718	3,193
403	Space Cooling	NC - HVAC	Commercial - SBDI	Custom	ROB	20%	465	0.150	12	$155	36%	69.1%	57.0%	9.4	0	0	0	0	0	0
404	Space Cooling	NC - Motors & Drives	Commercial - SBDI	Custom	ROB	20%	1,050	0.065	15	$120	100%	69.1%	62.1%	7.0	0	0	0	0	0	0
405	Space Cooling	Pumps & Fans	Commercial - SBDI	Custom	ROB	20%	1,200	0.020	15	$189	76%	69.1%	62.1%	5.8	529	7,940	16	366	2,385	3,390
406	Space Cooling	NC - Whole Building Design - Electric	Commercial - SBDI	Custom	ROB	20%	20,000	0.000	10	$4,000	60%	69.1%	62.1%	4.0	0	0	0	0	0	0
407	Space Cooling	NC - EMS - Electric	Commercial - SBDI	Custom	ROB	20%	1,053	0.000	10	$325	39%	69.1%	57.0%	4.0	0	0	0	0	0	0
408	Space Cooling	Custom RCx Project - EMS	Commercial - SBDI	Custom	Retrofit	20%	30,000	5.556	5	$4,800	75%	69.1%	62.1%	3.4	1,938	9,691	60	1,338	0	5,999
409	Space Heating	Air Source HP - < 5.4 Tons (≥14 SEER) Replacing Air Source HP - < 5.4 Tons (<14 SEER)	Commercial - SBDI	Prescriptive	ROB	4%	74	0.000	15	$50	10%	69.1%	39.3%	9.9	1	17	1	1	4	7
410	Space Heating	Ground Source HP - <11.25 Tons (≥14.3 SEER) Replacing Ground Source HP - <11.25 Tons (<14.3 SEER)	Commercial - SBDI	Prescriptive	ROB	14%	186	0.000	15	$50	46%	69.1%	50.5%	5.4	4	59	3	3	16	30
411	Space Heating	Ground Source HP - <11.25 Tons (≥17.3 SEER) Replacing Ground Source HP - <11.25 Tons (<17.3 SEER)	Commercial - SBDI	Prescriptive	ROB	14%	168	0.000	15	$50	46%	69.1%	50.5%	4.9	4	60	3	3	16	30
412	Space Heating	Air Source HP - Between 5.4 and 11.3 Tons (≥11.5 SEER) Replacing Air Source HP Between 5.4 and 11.3 Tons (<11.5 SEER)	Commercial - SBDI	Prescriptive	ROB	3%	40	0.000	15	$50	13%	69.1%	39.3%	4.2	1	13	1	1	3	5
413	Space Heating	ECM on Furnace Replacing Furnace with No ECM	Commercial - SBDI	SBDI	Retrofit	65%	720	0.000	20	$250	60%	69.1%	41.9%	4.0	0	0	0	0	0	0
414	Space Heating	Air Source HP - Between 11.3 and 20 Tons (≥11 SEER) Replacing Air Source HP Between 11.3 and 20 Tons (<11 SEER)	Commercial - SBDI	Prescriptive	ROB	3%	42	0.000	15	$50	18%	69.1%	39.3%	3.2	1	13	1	1	3	5
415	Space Heating	Water Source HP - Under 1.42 Tons (≥12 SEER) Replacing Water Source HP Under 1.42 Tons (<12 SEER)	Commercial - SBDI	Prescriptive	ROB	2%	23	0.000	15	$50	10%	69.1%	29.0%	3.1	1	10	0	0	1	3
416	Space Heating	PTHP - to 0.58 Tons 14+ SEER	Commercial - SBDI	Prescriptive	ROB	8%	106	0.000	15	$50	46%	69.1%	50.5%	3.1	2	34	2	2	9	17
417	Space Heating	Water Source HP - Between 1.42 and 5.42 Tons (≥12.8 SEER) Replacing Water Source HP Between 1.42 and 5.42 Tons (<12.8 SEER)	Commercial - SBDI	Prescriptive	ROB	2%	23	0.000	15	$50	11%	69.1%	29.0%	2.8	1	10	0	0	1	3
418	Space Heating	PTHP - 1.25+ Tons 14+ SEER	Commercial - SBDI	Prescriptive	ROB	7%	95	0.000	15	$50	46%	69.1%	50.5%	2.8	2	29	1	1	8	14
419	Space Heating	PTHP - 0.58 - 1.25 Tons 14 SEER	Commercial - SBDI	Prescriptive	ROB	5%	79	0.000	15	$50	46%	69.1%	50.5%	2.3	1	22	1	1	6	11
420	Space Heating	Water Source HP - Between 5.43 and 11.25 Tons (≥12.8 SEER) Replacing Water Source HP Between 5.43 and 11.25 Tons (<12.8 SEER)	Commercial - SBDI	Prescriptive	ROB	2%	23	0.000	15	$50	15%	69.1%	29.0%	2.2	1	10	0	0	1	3
421	Space Heating	Space Heating - Heat Recovery Ventilator	Commercial - SBDI	Custom	Retrofit	30%	2	0.003	15	$6	3%	69.1%	32.7%	36.1	0	0	0	0	0	0
422	Space Heating	Electric Zonal Heat	Commercial - SBDI	Custom	Retrofit	10%	286	0.000	15	$15	100%	69.1%	62.1%	12.7	0	0	0	0	0	0
423	Space Heating	Insulation - Ceiling	Commercial - SBDI	Custom	Retrofit	8%	1,590	0.000	20	$6,960	3%	69.1%	32.7%	6.9	56	1,126	4	39	237	324
424	Space Heating	Insulation - Wall Cavity	Commercial - SBDI	Custom	Retrofit	2%	1,173	0.000	20	$2,629	5%	69.1%	32.7%	6.9	13	268	1	10	59	80
425	Space Heating	Custom RCx Project - HVAC	Commercial - SBDI	Custom	Retrofit	20%	30,000	0.000	5	$10,000	36%	69.1%	57.0%	2.1	290	1,449	9	200	0	823

Appendix C: C&I Electric Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
426	Ventilation	Insulation - Ducting	Commercial - SBDI	Custom	Retrofit	20%	61	0.004	20	$66	11%	69.1%	44.4%	8.2	873	17,470	202	603	5,046	7,568
427	Ventilation	HVAC - Duct Repair and Sealing	Commercial - SBDI	Custom	Retrofit	23%	70	0.000	18	$200	4%	69.1%	32.7%	6.4	1,152	20,738	267	796	5,259	8,606
428	Ventilation	NC - Elec - Other Systems	Commercial - SBDI	Custom	Retrofit	20%	2,290	0.020	10	$205	100%	69.1%	62.1%	5.4	0	0	0	0	0	0
429	Cooking	ENERGY STAR Steamer - 3 Pan Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	57%	5,018	1.351	12	$3,500	11%	69.1%	39.3%	13.0	62	748	34	43	156	374
430	Cooking	ENERGY STAR Holding Cabinet -- 1/2 Size -- ENERGY STAR Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	58%	1,788	0.330	12	$1,783	7%	69.1%	39.3%	12.9	9	102	2	6	17	40
431	Cooking	ENERGY STAR Steamer - 6 Pan Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	57%	10,353	2.787	12	$3,500	25%	69.1%	50.5%	12.2	38	458	21	26	96	231
432	Cooking	ENERGY STAR Steamer - 5 Pan Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	57%	8,727	2.350	12	$3,500	21%	69.1%	50.5%	12.0	38	458	21	26	96	231
433	Cooking	ENERGY STAR Griddle Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	12%	7,147	1.924	12	$2,090	30%	69.1%	50.5%	11.8	2	22	0	1	5	11
434	Cooking	Holding Cabinets - Insulated - FA2 Full Size -ENERGY STAR Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	69%	5,278	0.960	12	$1,783	25%	69.1%	50.5%	10.6	2	19	1	1	4	10
435	Cooking	ENERGY STAR Oven - Combo Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	48%	18,432	3.530	12	$2,150	73%	69.1%	55.0%	10.6	6	67	3	4	16	39
436	Cooking	ENERGY STAR Oven - Convection Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	27%	3,235	0.620	12	$1,113	25%	69.1%	50.5%	10.5	53	631	31	36	155	372
437	Cooking	ENERGY STAR Fryer Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	17%	983	0.220	12	$500	18%	69.1%	45.8%	10.4	2	30	1	2	6	13
438	Cooking	ENERGY STAR Steamer - 4 Pan Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	57%	6,416	1.727	12	$3,500	19%	69.1%	45.8%	9.8	1	16	1	1	3	8
439	Behavioral	SEM	Commercial - SBDI	Custom	Retrofit	3%	1	0.000	5	$0	45%	69.1%	57.0%	2.8	921	4,603	316	705	0	3,040
440	Behavioral	Whole-Building Energy Monitoring	Commercial - SBDI	Custom	Retrofit	2%	1	0.000	3	$0	27%	69.1%	57.0%	1.8	767	2,301	264	587	0	1,520
441	Behavioral	Building Operator Certification	Commercial - SBDI	Custom	Retrofit	1%	190	0.021	3	$32	71%	69.1%	62.1%	1.7	327	982	113	251	0	706
442	Behavioral	Behavior Based Efficiency (Commercial Energy Reports)	Commercial - SBDI	Custom	Retrofit	0%	1	0.000	2	$0	100%	69.1%	62.1%	0.5	0	0	0	0	0	0
443	Office Equipment	POS Terminal	Commercial - SBDI	Custom	ROB	68%	121	0.011	6	$1	100%	69.1%	62.1%	63.0	9	52	9	9	0	51
444	Office Equipment	Printer/Copier/Fax	Commercial - SBDI	Custom	ROB	40%	223	0.021	6	$4	100%	69.1%	62.1%	20.9	12	70	12	12	0	69
445	Office Equipment	Computer Room Air Side Economizer	Commercial - SBDI	Custom	Retrofit	47%	440	0.000	10	$25	100%	69.1%	62.1%	8.4	341	3,413	11	236	636	1,962
446	Office Equipment	VFD for Process Fans -CRAC units	Commercial - SBDI	Custom	Retrofit	43%	2,279	0.000	15	$200	100%	69.1%	62.1%	7.6	208	3,118	6	144	991	1,528
447	Office Equipment	Computer Room Air Conditioner Economizer	Commercial - SBDI	Custom	Retrofit	47%	358	0.000	15	$82	52%	69.1%	62.1%	5.6	228	3,413	7	157	1,085	1,673
448	Office Equipment	Computer Room Hot Aisle Cold Aisle Configuration	Commercial - SBDI	Custom	Retrofit	13%	125	0.000	15	$156	10%	69.1%	44.4%	5.6	63	938	2	43	217	347
449	Office Equipment	Electrically Commutated Plug Fans in data centers	Commercial - SBDI	Custom	Retrofit	33%	1,445	0.000	15	$718	24%	69.1%	51.7%	5.6	161	2,415	5	111	650	1,040
450	Office Equipment	High Efficiency CRAC unit	Commercial - SBDI	Custom	Retrofit	30%	162	0.000	15	$63	31%	69.1%	57.0%	5.6	144	2,164	4	100	642	1,028
451	Office Equipment	Laptop	Commercial - SBDI	Custom	ROB	32%	40	0.004	6	$6	83%	69.1%	62.1%	3.2	134	804	121	121	0	724
452	Office Equipment	Monitor	Commercial - SBDI	Custom	ROB	21%	15	0.001	6	$12	15%	69.1%	44.4%	3.2	44	261	41	41	0	246
453	Office Equipment	Desktop Computer	Commercial - SBDI	Custom	ROB	43%	81	0.000	4	$5	100%	69.1%	62.1%	3.2	1,293	5,170	508	893	0	3,210
454	Office Equipment	Server	Commercial - SBDI	Custom	ROB	43%	81	0.000	4	$5	100%	69.1%	62.1%	3.2	810	3,242	25	560	0	2,006
455	Office Equipment	Office Equipment - Plug Load Occupancy Sensors	Commercial - SBDI	Custom	Retrofit	15%	169	0.000	8	$70	29%	69.1%	57.0%	3.2	750	5,999	24	543	454	3,408
456	Office Equipment	Office Equipment - Smart Plug Load Sensors	Commercial - SBDI	Custom	Retrofit	15%	23	0.000	8	$15	19%	69.1%	51.7%	3.2	750	5,999	24	543	412	3,090
457	Other	Compressed Air - Engineered Nozzle -- per shift -- .25" nozzle	Commercial - SBDI	Custom	Retrofit	42%	1,349	0.511	15	$14	100%	69.1%	62.1%	140.8	52	786	3	36	257	425
458	Other	Compressed Air - Engineered Nozzle -- per shift -- .125" nozzle	Commercial - SBDI	Custom	Retrofit	42%	430	0.163	15	$14	100%	69.1%	62.1%	44.9	52	786	3	36	257	425
459	Other	Transformer - High Efficiency	Commercial - SBDI	Custom	Retrofit	2%	552	0.057	30	$810	8%	69.1%	32.7%	11.8	32	646	5	22	206	206
460	Other	NC - Envelope	Commercial - SBDI	Custom	Retrofit	20%	30,000	2.000	20	$18,000	20%	69.1%	51.7%	8.4	509	10,189	16	352	2,591	2,810
461	Other	VFD on Pool Pump	Commercial - SBDI	Custom	Retrofit	20%	1,425	0.254	12	$200	86%	69.1%	62.1%	7.3	67	808	4	46	209	470
462	Other	Compressed Air Audits and Leak Repair	Commercial - SBDI	Custom	Retrofit	50%	496	0.079	1	$8	100%	69.1%	62.1%	4.8	943	943	59	651	0	585
463	Other	Motors - Variable Frequency Drive (Compressed Air)	Commercial - SBDI	Custom	Retrofit	17%	104,220	4.680	10	$27,160	46%	69.1%	57.0%	4.5	64	641	4	44	110	354
464	Other	NC - Compressed Air	Commercial - SBDI	Custom	ROB	20%	1,336	0.175	15	$300	53%	69.1%	62.1%	7.8	0	0	0	0	0	0
465	Other	NC - Pumps/Fans/VFDs	Commercial - SBDI	Custom	ROB	20%	1,615	0.100	15	$364	53%	69.1%	62.1%	6.6	0	0	0	0	0	0
466	Other	EMS/Controls - Electric	Commercial - SBDI	Custom	Retrofit	20%	1,550	0.100	10	$200	93%	69.1%	62.1%	4.8	817	8,173	53	585	1,599	5,160
467	Other	Other - Electric	Commercial - SBDI	Custom	Retrofit	20%	7,300	0.300	10	$1,150	76%	69.1%	62.1%	4.5	1,586	15,864	99	1,095	2,955	9,534
468	Other	Custom RCx Project - Other	Commercial - SBDI	Custom	Retrofit	20%	50,000	11.111	5	$8,000	75%	69.1%	62.1%	3.6	981	4,904	63	702	0	3,198
469	Other	Custom RCx Project - Process	Commercial - SBDI	Custom	Retrofit	20%	50,000	9.259	5	$8,000	75%	69.1%	62.1%	3.4	981	4,904	63	702	0	3,198
470	Refrigeration	ECM Cooler Motors Replacing Cooler Shaded Pole or PSC Motors	Commercial - SBDI	SBDI	ROB	52%	1,365	0.140	15	$226	18%	69.1%	41.9%	30.1	132	1,985	91	91	635	1,191
471	Refrigeration	LED Refrigerated Display Case Lighting	Commercial - SBDI	SBDI	Retrofit	45%	438	0.650	8	$150	29%	69.1%	41.9%	22.8	143	1,146	99	99	60	480
472	Refrigeration	ECM Freezer Motors Replacing Freezer Shaded Pole or PSC Motors	Commercial - SBDI	SBDI	ROB	52%	1,365	0.140	15	$226	27%	69.1%	41.9%	20.0	37	550	25	25	176	330
473	Refrigeration	ENERGY STAR Ice Machine - 500-1000 lb/Day Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	14%	1,188	0.117	9	$1,485	3%	69.1%	29.0%	13.6	65	581	44	45	81	366
474	Refrigeration	ENERGY STAR Ice Machine - ≥1000 lb/Day Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	20%	1,525	0.146	9	$1,821	4%	69.1%	39.3%	13.3	92	830	63	64	116	523
475	Refrigeration	LED Freezer Display Case Lighting	Commercial - SBDI	SBDI	Retrofit	45%	472	0.070	8	$150	32%	69.1%	41.9%	5.7	17	136	12	12	7	57
476	Refrigeration	Refrigerator - High Efficiency Compressor	Commercial - SBDI	Custom	ROB	1%	875	0.000	13	$552	19%	69.1%	51.7%	4.9	1	16	1	1	4	9
477	Refrigeration	ENERGY STAR Commercial Refrigerator 30- 50ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	26%	393	0.045	12	$750	9%	69.1%	29.0%	4.6	129	1,550	76	89	284	682
478	Refrigeration	ENERGY STAR Commercial Freezer 15-30 ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	21%	613	0.070	12	$400	26%	69.1%	45.8%	4.4	36	432	21	25	82	198
479	Refrigeration	ENERGY STAR Commercial Refrigerator 15-30ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	28%	287	0.033	12	$500	10%	69.1%	29.0%	4.4	137	1,644	81	95	301	724
480	Refrigeration	Motion Sensors on LED cases Replacing No Controls	Commercial - SBDI	SBDI	Retrofit	45%	133	0.000	8	$26	52%	69.1%	45.6%	3.8	160	1,282	111	111	73	585
481	Refrigeration	ENERGY STAR Commercial Refrigerator ≥50ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	24%	501	0.057	12	$900	11%	69.1%	29.0%	3.8	118	1,411	69	81	259	621
482	Refrigeration	ENERGY STAR Commercial Freezer <15ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	19%	320	0.037	12	$150	50%	69.1%	50.5%	3.2	32	381	19	22	80	192
483	Refrigeration	ENERGY STAR Commercial Refrigerator <15ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	30%	208	0.024	12	$250	22%	69.1%	39.3%	2.9	151	1,808	89	104	331	795
484	Refrigeration	Vending Machine Occupancy Sensor - Refrigerated Beverage Replacing No control	Commercial - SBDI	SBDI	Retrofit	46%	1,612	0.000	5	$216	67%	69.1%	45.6%	2.8	663	3,315	458	458	0	1,512
485	Refrigeration	Vending Machine Occupancy Sensor - Refrigerated Glass Front Cooler Replacing No control	Commercial - SBDI	SBDI	Retrofit	30%	1,209	0.000	5	$216	51%	69.1%	45.6%	2.7	432	2,162	299	299	0	986
486	Refrigeration	ENERGY STAR Commercial Freezer 30-50 ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	18%	802	0.092	12	$550	47%	69.1%	45.8%	2.3	30	365	18	21	70	167
487	Refrigeration	ENERGY STAR Commercial Freezer >50ft³ Replacing Non-ENERGY STAR Model	Commercial - SBDI	Prescriptive	ROB	17%	1,112	0.127	12	$700	59%	69.1%	50.5%	2.0	29	344	17	20	72	174
488	Refrigeration	Refrigerator - Floating Head Pressure	Commercial - SBDI	Custom	Retrofit	9%	1,264	0.000	15	$80	100%	69.1%	62.1%	10.5	65	976	11	48	354	602
489	Refrigeration	Anti-Sweat Heater Controls - Cooler Replacing No Controls	Commercial - SBDI	SBDI	Retrofit	55%	541	0.000	12	$250	14%	69.1%	38.0%	8.6	59	711	44	44	124	299
490	Refrigeration	Auto Door Closers - Walk-In Freezer Replacing Door with manual closer	Commercial - SBDI	SBDI	Retrofit	15%	2,307	0.309	8	$157	99%	69.1%	45.6%	8.3	24	192	18	18	12	97
491	Refrigeration	Anti-Sweat Heater Controls - Freezer Replacing No Controls	Commercial - SBDI	SBDI	Retrofit	55%	1,278	0.000	12	$250	46%	69.1%	45.6%	6.2	34	411	25	25	84	202
492	Refrigeration	Auto Door Closers - Walk-In cooler Replacing Door with manual closer	Commercial - SBDI	SBDI	Retrofit	15%	943	0.137	8	$157	68%	69.1%	45.6%	5.1	53	421	39	39	27	213
493	Refrigeration	Strip Curtain - Walk-In Freezer Replacing No Cover	Commercial - SBDI	SBDI	Retrofit	80%	2,974	0.339	6	$256	99%	69.1%	45.6%	4.8	170	1,022	126	126	0	520
494	Refrigeration	Strip Curtain - Walk-In Cooler Replacing No Cover	Commercial - SBDI	SBDI	Retrofit	80%	422	0.048	6	$256	15%	69.1%	38.0%	4.5	374	2,244	275	275	0	944
495	Refrigeration	Evaporator Fan Controls Installed on Shade Pole or PSC Replacing No Controls	Commercial - SBDI	SBDI	Retrofit	25%	796	0.082	5	$421	17%	69.1%	38.0%	3.8	266	1,328	196	196	0	694
496	Refrigeration	NC - Refrigeration	Commercial - SBDI	Custom	ROB	20%	75,000	13.889	12	$35,000	26%	69.1%	57.0%	7.4	0	0	0	0	0	0
497	Refrigeration	Refrigeration	Commercial - SBDI	Custom	ROB	20%	3,510	0.350	12	$555	76%	69.1%	62.1%	6.1	444	5,329	14	307	1,366	2,907
498	Refrigeration	Custom RCx Project - Refrigeration	Commercial - SBDI	Custom	Retrofit	20%	30,000	5.556	5	$10,000	36%	69.1%	57.0%	3.4	1,335	6,675	138	922	0	3,805
499	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - High Temp /Elec Heat Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	38%	27,408	4.170	20	$970	72%	69.1%	55.0%	47.8	1	30	1	1	13	20
500	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - Low Temp /Elec Heat Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	38%	18,811	2.860	20	$970	62%	69.1%	55.0%	38.3	1	30	1	1	13	20

Appendix C: C&I Electric Measure Assumption Detail

															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
501	Water Heating	ENERGY STAR Dishwasher - Single Tank Conv - High Temp / Elect Heat Replacing Non-ENERGY STAR model	Commercial - SBDI	Prescriptive	ROB	20%	9,212	1.400	20	$2,050	46%	69.1%	55.0%	11.8	1	16	1	1	7	11
502	Water Heating	Energy Star Clothes Washer	Commercial - SBDI	Custom	ROB	31%	485	0.324	7	$63	93%	69.1%	62.1%	9.2	32	223	7	22	0	138
503	Water Heating	Heat Pump Water Heater	Commercial - SBDI	Custom	ROB	59%	2,124	0.000	10	$433	59%	69.1%	62.1%	4.0	140	1,405	4	97	260	780
504	Water Heating	Water Heater - Faucet Aerators/Low Flow Nozzles	Commercial - SBDI	Custom	Retrofit	33%	848	0.097	10	$3	100%	69.1%	62.1%	220.5	8	81	7	7	21	69
505	Water Heating	Pre-rinse Spray Valves	Commercial - SBDI	Custom	Retrofit	20%	1,284	0.000	5	$93	100%	69.1%	62.1%	3.4	10	50	8	8	0	43
506	Water Heating	NC - Process - Electric	Commercial - SBDI	Custom	Retrofit	20%	200,000	10.000	8	$18,000	100%	69.1%	62.1%	5.0	0	0	0	0	0	0
507	Water Heating	Process - Electric	Commercial - SBDI	Custom	Retrofit	20%	10,000	1.000	8	$1,750	69%	69.1%	62.1%	4.3	30	238	1	21	18	139
508	Process - Agriculture	VFD for Process Pumps - Irrigation	Industrial	Custom	ROB	43%	0	0.000	10	$0	12%	0.0%	0.0%	0.0	74	742	17	51	99	329
509	Process - Agriculture	Scroll Compressor with Heat Exchanger for Dairy Refrigeration	Industrial	Custom	ROB	61%	0	0.000	15	$0	16%	0.0%	0.0%	0.0	70	1,055	16	49	250	453
510	Process - Agriculture	VFD for Process Pumps - Agriculture	Industrial	Custom	ROB	43%	0	0.000	15	$0	17%	0.0%	0.0%	0.0	49	742	11	34	205	371
511	Process - Agriculture	VFD for Process Fans - Agriculture	Industrial	Custom	Retrofit	28%	0	0.000	15	$0	31%	0.0%	0.0%	0.0	8	127	2	6	39	69
512	Process - Agriculture	HVLS Fans (20' - 24')	Industrial	Custom	ROB	50%	0	0.000	18	$0	15%	0.0%	0.0%	0.0	13	227	3	9	61	93
513	Process - Agriculture	HE Exhaust Fans 24"-72" Diameter	Industrial	Custom	ROB	30%	0	0.000	18	$0	7%	0.0%	0.0%	0.0	8	137	2	5	27	43
514	Process - Agriculture	Milk Pre-Cooler Heat Exchanger	Industrial	Custom	ROB	31%	0	0.000	15	$0	97%	0.0%	0.0%	0.0	5	76	1	4	25	45
515	Process - Agriculture	Variable Speed Drive withHeat Exchanger, Milk	Industrial	Custom	ROB	66%	0	0.000	15	$0	3%	0.0%	0.0%	0.0	76	1,145	18	53	200	370
516	Process - Agriculture	Variable Speed Drives for Dairy Vacuum Pumps	Industrial	Custom	ROB	35%	0	0.000	15	$0	4%	0.0%	0.0%	0.0	40	603	9	28	105	195
517	Process - Agriculture	Livestock Waterer/Livestock Waterer - Energy Free	Industrial	Custom	Retrofit	48%	0	0.000	18	$0	22%	0.0%	0.0%	0.0	6	117	2	4	37	55
518	Process - Agriculture	Fan Thermostat Controller	Industrial	Custom	Retrofit	19%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	2	31	1	2	13	24
519	Process - Agriculture	Grain Storage Temperature and Moisture Management Controller	Industrial	Custom	Retrofit	49%	0	0.000	15	$0	18%	0.0%	0.0%	0.0	8	120	2	6	33	60
520	Process - Agriculture	Engine block heater Timer for agricultural Equipment	Industrial	Custom	Retrofit	64%	0	0.000	8	$0	100%	0.0%	0.0%	0.0	20	157	5	14	12	97
521	Process - Agriculture	Low Pressure Sprinkler Nozzles	Industrial	Custom	Retrofit	15%	0	0.000	5	$0	16%	0.0%	0.0%	0.0	28	141	8	23	0	81
522	Process - Agriculture	Dairy Refrigeration Tune Up	Industrial	Custom	Retrofit	4%	0	0.000	1	$0	23%	0.0%	0.0%	0.0	7	7	2	5	0	4
523	Exterior Lighting	LED Exterior Replacing HID 251-400W	Industrial	Prescriptive	Retrofit	62%	0	0.000	13	$0	31%	0.0%	0.0%	0.0	15	191	11	11	68	148
524	Exterior Lighting	LED Exterior Replacing HID 1000W	Industrial	Prescriptive	Retrofit	39%	0	0.000	13	$0	70%	0.0%	0.0%	0.0	9	122	7	7	44	94
525	Exterior Lighting	Lighting - Exterior - Other	Industrial	Custom	Retrofit	66%	0	0.000	13	$0	46%	0.0%	0.0%	0.0	94	1,227	73	73	442	957
526	Interior Lighting	LED Interior Replacing HID 1000W	Industrial	Prescriptive	Retrofit	76%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	351	0	369	0	0	0
527	Interior Lighting	LED 2x4 Recessed Fixture Replacing T12 4ft 3 Lamp or 4 Lamp	Industrial	Prescriptive	Retrofit	66%	0	0.000	14	$0	51%	0.0%	0.0%	0.0	305	0	320	0	0	0
528	Interior Lighting	LED Interior Replacing HID 176-250W	Industrial	Prescriptive	Retrofit	64%	0	0.000	20	$0	93%	0.0%	0.0%	0.0	297	1,484	312	0	0	1,025
529	Interior Lighting	LED Interior Replacing HID 251-400W	Industrial	Prescriptive	Retrofit	66%	0	0.000	15	$0	59%	0.0%	0.0%	0.0	308	0	324	0	0	0
530	Interior Lighting	Lighting - Interior - Other	Industrial	Custom	Retrofit	69%	0	0.000	12	$0	12%	0.0%	0.0%	0.0	3,535	0	3,719	0	0	0
531	Interior Lighting	Lighitng - Interior - T5 HO	Industrial	Custom	Retrofit	30%	0	0.000	15	$0	15%	0.0%	0.0%	0.0	768	0	809	0	0	0
532	Interior Lighting	Lighting - Interior - T5/T8	Industrial	Custom	Retrofit	30%	0	0.000	15	$0	37%	0.0%	0.0%	0.0	768	0	809	0	0	0
533	Interior Lighting	Industrial Lighting Controls	Industrial	Custom	Retrofit	35%	0	0.000	10	$0	67%	0.0%	0.0%	0.0	3,643	36,425	2,502	2,502	7,669	25,564
534	Process - Machine Drive	High Efficiency Dryers (comp air)	Industrial	Custom	ROB	33%	0	0.000	14	$0	14%	0.0%	0.0%	0.0	89	1,246	14	61	277	534
535	Process - Machine Drive	Motors - Variable Frequency Drive (Compressed Air)	Industrial	Custom	ROB	17%	0	0.000	10	$0	46%	0.0%	0.0%	0.0	103	1,030	11	71	176	568
536	Process - Machine Drive	VSD Air Compressor-Install VSD Air Compressor for Trim	Industrial	Custom	ROB	20%	0	0.000	15	$0	18%	0.0%	0.0%	0.0	60	906	24	42	250	465
537	Process - Machine Drive	Air Compressor-Adding an Air Compressor to Aid Low Load Conditions	Industrial	Custom	ROB	20%	0	0.000	15	$0	56%	0.0%	0.0%	0.0	60	906	24	42	300	555
538	Process - Machine Drive	Elec motors replacing pneumatic (comp air)	Industrial	Custom	ROB	83%	0	0.000	10	$0	37%	0.0%	0.0%	0.0	3,555	35,553	570	2,455	6,080	20,060
539	Process - Machine Drive	Variable Speed Air Compressor-Replace Fixed Speed Air Compressor with Variable Speed - ROB	Industrial	Custom	ROB	20%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	77	1,148	12	53	379	662
540	Process - Machine Drive	Compressed Air-Fixed Speed Air Compressor - ROB	Industrial	Custom	ROB	3%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	11	172	2	8	57	99
541	Process - Machine Drive	Compressed Air - System Maintenance	Industrial	Custom	Retrofit	1%	0	0.000	3	$0	72%	0.0%	0.0%	0.0	23	69	9	16	0	44
542	Process - Machine Drive	Automatic Drains, High efficiency nozzles and other (comp air)	Industrial	Custom	ROB	42%	0	0.000	5	$0	71%	0.0%	0.0%	0.0	406	2,029	163	287	0	1,304
543	Process - Machine Drive	Receiver Capacity Addition (comp air)	Industrial	Custom	Retrofit	10%	0	0.000	10	$0	55%	0.0%	0.0%	0.0	61	612	10	43	118	389
544	Process - Machine Drive	Compressed Air Audits and Leak Repair	Industrial	Custom	Retrofit	50%	0	0.000	1	$0	100%	0.0%	0.0%	0.0	3,232	3,232	343	2,287	0	2,076
545	Process - Machine Drive	Compressed Air - Advanced Compressor Controls	Industrial	Custom	ROB	4%	0	0.000	15	$0	85%	0.0%	0.0%	0.0	45	676	18	32	232	429
546	Process - Machine Drive	Storage Tank Addition (comp air)	Industrial	Custom	ROB	30%	0	0.000	25	$0	100%	0.0%	0.0%	0.0	73	1,470	10	42	585	609
547	Process - Machine Drive	Compressed Air - Engineered Nozzle -- per shift -- .125" nozzle	Industrial	Custom	Retrofit	42%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	180	2,695	19	127	912	1,508
548	Process - Machine Drive	Compressed Air - Engineered Nozzle -- per shift -- .25" nozzle	Industrial	Custom	Retrofit	42%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	180	2,694	19	127	911	1,507
549	Process - Machine Drive	Compressed Air	Industrial	Custom	Retrofit	20%	0	0.000	15	$0	76%	0.0%	0.0%	0.0	317	4,756	73	219	1,575	2,806
550	Process - Machine Drive	Custom RCx Project -Comp Air	Industrial	Custom	Retrofit	20%	0	0.000	5	$0	36%	0.0%	0.0%	0.0	943	4,715	219	653	0	2,697
551	Process - Machine Drive	Custom RCx Project - Leak Repair	Industrial	Custom	Retrofit	20%	0	0.000	5	$0	36%	0.0%	0.0%	0.0	566	2,829	131	392	0	1,618
552	Process - Machine Drive	Synchronous belt drives	Industrial	Custom	ROB	3%	0	0.000	14	$0	53%	0.0%	0.0%	0.0	175	2,446	28	121	759	1,438
553	Process - Machine Drive	Motors - Efficient Rewind	Industrial	Custom	ROB	2%	0	0.000	8	$0	100%	0.0%	0.0%	0.0	66	525	47	47	47	378
554	Process - Machine Drive	Motors & Drives	Industrial	Custom	Retrofit	20%	0	0.000	15	$0	76%	0.0%	0.0%	0.0	770	11,550	178	532	3,824	6,815
555	Process - Machine Drive	Custom RCx Project - Motors & Drives	Industrial	Custom	Retrofit	20%	0	0.000	5	$0	24%	0.0%	0.0%	0.0	2,262	11,311	527	1,573	0	5,896
556	Process - Machine Drive	VFD for Process Fans	Industrial	Custom	ROB	28%	0	0.000	15	$0	38%	0.0%	0.0%	0.0	190	2,844	30	131	863	1,507
557	Process - Machine Drive	Fan System - Optimization	Industrial	Custom	Retrofit	6%	0	0.000	15	$0	36%	0.0%	0.0%	0.0	80	1,195	31	55	364	674
558	Process - Machine Drive	Custom RCx Project - Pumps/Fans/VFDs	Industrial	Custom	Retrofit	20%	0	0.000	5	$0	36%	0.0%	0.0%	0.0	2,265	11,323	524	1,564	0	6,455
559	Process - Machine Drive	VFD for Process Pumps	Industrial	Custom	ROB	29%	0	0.000	15	$0	52%	0.0%	0.0%	0.0	1,001	15,016	160	691	4,963	8,664
560	Process - Machine Drive	Pumping System - Optimization	Industrial	Custom	ROB	16%	0	0.000	10	$0	100%	0.0%	0.0%	0.0	1,626	16,258	645	1,134	3,067	10,222
561	Process - Machine Drive	Energy Information System	Industrial	Custom	ROB	1%	0	0.000	15	$0	19%	0.0%	0.0%	0.0	84	1,264	36	63	386	719
562	Process - Machine Drive	Advanced Lubricants	Industrial	Custom	Retrofit	3%	0	0.000	1	$0	100%	0.0%	0.0%	0.0	3,239	3,239	1,377	2,420	0	2,229
563	Process - Machine Drive	Sensors & Controls	Industrial	Custom	ROB	3%	0	0.000	15	$0	83%	0.0%	0.0%	0.0	249	3,738	106	186	1,372	2,540
564	Process - Machine Drive	Electric Supply System Improvements	Industrial	Custom	ROB	3%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	0	0	0	0	0	0
565	Other	Transformer - High Efficiency	Industrial	Custom	Retrofit	2%	0	0.000	30	$0	8%	0.0%	0.0%	0.0	0	0	0	0	0	0
566	Ventilation	VFD - Supply Fan 1-20HP Replacing Supply Fan 1-20HP No VFD	Industrial	Prescriptive	ROB	30%	0	0.000	15	$0	55%	0.0%	0.0%	0.0	234	3,505	161	161	1,027	1,926
567	Ventilation	VFD - Return Fan 1-20HP Replacing Return Fan 1-20HP No VFD	Industrial	Prescriptive	ROB	30%	0	0.000	15	$0	48%	0.0%	0.0%	0.0	234	3,505	161	161	1,027	1,926
568	Ventilation	VFD - Tower Fan 1-20HP Replacing Tower Fan 1-20HP No VFD	Industrial	Prescriptive	ROB	30%	0	0.000	15	$0	29%	0.0%	0.0%	0.0	234	3,505	161	161	943	1,769
569	Space Cooling	Unitary AC Unit- 241,000 - 760,000 BTUH (≥10.1 EER) Replacing Unitary AC - Unit- 241,000 - 760,000 BTUH (<10.1 EER)	Industrial	Prescriptive	ROB	12%	0	0.000	15	$0	10%	0.0%	0.0%	0.0	390	5,845	269	269	1,226	2,299
570	Space Cooling	Unitary AC Unit - 136,000-240,000 BTUH (≥11 EER) Replacing Unitary AC Unit - 136,000-240,000 BTUH (<11 EER)	Industrial	Prescriptive	ROB	15%	0	0.000	15	$0	12%	0.0%	0.0%	0.0	492	7,387	340	340	1,550	2,906
571	Space Cooling	Geothermal Heat Pump	Industrial	Custom	ROB	44%	0	0.000	30	$0	12%	0.0%	0.0%	0.0	87	1,748	2	40	327	327
572	Space Cooling	Air Source HP - Between 20.1 and 63.3 Tons (≥10.1 SEER) Replacing Air Source HP Between 20.1 and 63.3 Tons (<10.1 SEER)	Industrial	Prescriptive	ROB	15%	0	0.000	15	$0	23%	0.0%	0.0%	0.0	61	911	42	42	191	358
573	Space Cooling	Room AC	Industrial	Custom	ROB	18%	0	0.000	15	$0	11%	0.0%	0.0%	0.0	10	153	0	7	33	47
574	Space Cooling	Insulation - Ceiling	Industrial	Custom	Retrofit	8%	0	0.000	20	$0	1%	0.0%	0.0%	0.0	122	2,431	99	99	1,330	2,046
575	Space Cooling	Chiller - Chilled Water Reset	Industrial	Custom	Retrofit	25%	0	0.000	10	$0	10%	0.0%	0.0%	0.0	505	5,046	16	366	726	2,173
576	Space Heating	Geothermal Heat Pump	Industrial	Custom	ROB	44%	0	0.000	23	$0	6%	0.0%	0.0%	0.0	5	99	0	3	19	20

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															MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Elec Savings	Per Unit Elec Savings	Per Unit Summer kW	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
577	Space Heating	Insulation - Ceiling	Industrial	Custom	ROB	8%	0	0.000	20	$0	2%	0.0%	0.0%	0.0	13	266	10	10	136	209
578	Space Heating	Air Source HP - Between 20.1 and 63.3 Tons (≥10.1 SEER) Replacing Air Source HP Between 20.1 and 63.3 Tons (<10.1 SEER)	Industrial	Prescriptive	ROB	3%	0	0.000	15	$0	23%	0.0%	0.0%	0.0	1	8	0	0	1	2
579	Behavioral	SEM	Industrial	Custom	Retrofit	3%	0	0.000	5	$0	100%	0.0%	0.0%	0.0	5,374	26,872	1,781	3,967	0	8,911
580	Behavioral	Whole-Building Energy Monitoring	Industrial	Custom	Retrofit	2%	0	0.000	3	$0	27%	0.0%	0.0%	0.0	1,991	5,972	660	1,469	0	1,818
581	Behavioral	Building Operator Certification	Industrial	Custom	Retrofit	1%	0	0.000	3	$0	71%	0.0%	0.0%	0.0	0	0	0	0	0	0
582	Behavioral	Behavior Based Efficiency (Commercial Energy Reports)	Industrial	Custom	Retrofit	0%	0	0.000	2	$0	100%	0.0%	0.0%	0.0	0	0	0	0	0	0
583	Process - Process Cooling & Refrigeration	Evaporator Fan Motor Controls	Industrial	Custom	ROB	2%	0	0.000	5	$0	15%	0.0%	0.0%	0.0	13	64	5	9	0	29
584	Process - Process Cooling & Refrigeration	Refrigerant charging correction	Industrial	Custom	ROB	2%	0	0.000	2	$0	54%	0.0%	0.0%	0.0	32	64	13	22	0	40
585	Process - Process Cooling & Refrigeration	Floating Head Pressure Control	Industrial	Custom	ROB	3%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	32	483	13	22	160	296
586	Process - Process Cooling & Refrigeration	Air Cooled Chiller Upgrade - Process	Industrial	Custom	Retrofit	41%	0	0.000	20	$0	30%	0.0%	0.0%	0.0	323	6,452	127	223	2,383	3,411
587	Process - Process Cooling & Refrigeration	Water Cooled Process Chiller - Process	Industrial	Custom	Retrofit	10%	0	0.000	20	$0	18%	0.0%	0.0%	0.0	107	2,142	11	74	661	801
588	Process - Process Cooling & Refrigeration	Sensors & Controls	Industrial	Custom	ROB	3%	0	0.000	15	$0	83%	0.0%	0.0%	0.0	32	477	12	22	158	292
589	Process - Process Cooling & Refrigeration	Energy Information System	Industrial	Custom	ROB	1%	0	0.000	15	$0	19%	0.0%	0.0%	0.0	11	161	4	7	44	83
590	Process - Process Cooling & Refrigeration	Electric Supply System Improvements	Industrial	Custom	ROB	3%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	32	477	12	22	158	292
591	Process - Process Cooling & Refrigeration	Improved Refrigeration	Industrial	Custom	ROB	10%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	111	1,658	43	76	549	1,016
592	Process - Process Cooling & Refrigeration	Evaporator Motor Reduction - ROB	Industrial	Custom	ROB	2%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	3	47	1	2	16	29
593	Process - Process Heating	Industrial-Process-WWTP Dissolved Oxygen (DO) Aeration	Industrial	Custom	ROB	30%	0	0.000	10	$0	29%	0.0%	0.0%	0.0	171	1,710	67	118	292	975
594	Process - Process Heating	Electric Supply System Improvements	Industrial	Custom	ROB	3%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	256	3,841	101	177	1,277	2,364
595	Process - Process Heating	Sensors & Controls	Industrial	Custom	ROB	3%	0	0.000	15	$0	83%	0.0%	0.0%	0.0	256	3,841	101	177	1,277	2,364
596	Process - Process Heating	Energy Information System	Industrial	Custom	ROB	1%	0	0.000	15	$0	19%	0.0%	0.0%	0.0	87	1,298	34	60	359	669
597	Process - Industrial	High Efficiency Welders	Industrial	Custom	ROB	29%	0	0.000	15	$0	100%	0.0%	0.0%	0.0	59	884	18	41	293	531
598	Process - Industrial	High Speed Turbo Blower for Wastewater	Industrial	Custom	ROB	20%	0	0.000	20	$0	14%	0.0%	0.0%	0.0	25	499	3	17	136	170
599	Process - Industrial	Hybrid Injection Molding Machine	Industrial	Custom	ROB	51%	0	0.000	20	$0	33%	0.0%	0.0%	0.0	215	4,291	22	148	1,460	1,769
600	Process - Industrial	Fiber Laser Replacing CO2 laser (auto industry)	Industrial	Custom	ROB	33%	0	0.000	20	$0	4%	0.0%	0.0%	0.0	289	5,790	30	200	1,184	1,526
601	Process - Industrial	3 Phase High Eff Battery Charger	Industrial	Custom	ROB	7%	0	0.000	15	$0	76%	0.0%	0.0%	0.0	81	1,208	13	56	399	697
602	Process - Industrial	Barrel Insulation - Inj. Molding (plastics)	Industrial	Custom	ROB	18%	0	0.000	5	$0	100%	0.0%	0.0%	0.0	303	1,514	31	209	0	940
603	Process - Industrial	Pellet Dryer Insulation (plastics)	Industrial	Custom	ROB	17%	0	0.000	5	$0	40%	0.0%	0.0%	0.0	286	1,430	30	198	0	815
604	Process - Industrial	Lab Fume Hood Ventilation Reduction	Industrial	Custom	ROB	19%	0	0.000	15	$0	28%	0.0%	0.0%	0.0	45	673	5	31	202	335
605	Process - Industrial	Insulation for Process Environment or Equipment - Process	Industrial	Custom	Retrofit	10%	0	0.000	20	$0	40%	0.0%	0.0%	0.0	694	13,880	72	479	4,724	5,721
606	Process - Industrial	On-Demand ventilation control for Dust and Fume Collection Systems	Industrial	Custom	ROB	19%	0	0.000	15	$0	38%	0.0%	0.0%	0.0	109	1,628	11	75	490	810
607	Process - Industrial	Industrial Air Curtain	Industrial	Custom	ROB	18%	0	0.000	15	$0	28%	0.0%	0.0%	0.0	103	1,542	11	71	464	767
608	Process - Industrial	Efficient Process Motor Upgrade - Process	Industrial	Custom	Retrofit	19%	0	0.000	15	$0	67%	0.0%	0.0%	0.0	0	0	0	0	0	0
609	Process - Industrial	Process Compressor Optimization - Process	Industrial	Custom	Retrofit	19%	0	0.000	15	$0	57%	0.0%	0.0%	0.0	0	0	0	0	0	0
610	Process - Industrial	Process Controls / EMS - Process	Industrial	Custom	Retrofit	10%	0	0.000	15	$0	70%	0.0%	0.0%	0.0	921	13,812	96	637	4,524	7,481

Appendix D C&I Natural Gas Efficiency Measure Data

Appendix D: C&I Gas Measure Assumption Detail

														MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
1	Cooking	Convection Oven	Commercial - Existing	Custom	ROB	16%	12.9	12	$1,113.0	12%	68.7%	62.0%	2.6	626	7,507	244	5,157	234	4,649
2	Cooking	Energy Star Combination Oven	Commercial - Existing	Custom	ROB	28%	27.8	12	$2,125.0	13%	68.7%	27.7%	2.6	1,745	20,935	54	13,728	30	5,098
3	Cooking	Fryer	Commercial - Existing	Custom	ROB	32%	50.8	12	$500.0	100%	68.7%	54.7%	2.7	9,483	113,795	293	74,619	78	49,221
4	Cooking	Griddle	Commercial - Existing	Custom	ROB	11%	13.1	12	$2,090.0	6%	68.7%	27.7%	2.6	1,014	12,172	31	7,982	18	2,964
5	Cooking	Infrared Charbroiler	Commercial - Existing	Custom	ROB	25%	113.2	12	$11,970.0	9%	68.7%	27.7%	2.6	1,424	17,084	44	11,202	25	4,160
6	Cooking	Infrared Upright Broiler	Commercial - Existing	Custom	ROB	38%	93.7	12	$5,040.0	19%	68.7%	27.7%	2.6	2,150	25,795	66	16,915	38	6,282
7	Cooking	Steam Cooker	Commercial - Existing	Custom	ROB	53%	105.4	12	$3,500.0	30%	68.7%	27.7%	2.6	1,852	22,222	57	14,572	32	5,412
8	Cooking	Kitchen	Commercial - Existing	Custom	ROB	20%	70.0	8	$1,120.0	63%	68.7%	44.5%	1.8	9,101	72,811	281	49,784	61	29,364
9	Space Heating	(≥85% AFUE) Furnace or Unit Heater Replacing Standard-E Unit ≤1000 MBH	Commercial - Existing	Prescriptive	ROB	8%	0.1	20	$1.4	89%	68.7%	54.7%	3.5	15,800	315,996	3,639	189,835	3,006	145,479
10	Space Heating	(≥93% AFUE) Furnace or Unit Heater Replacing Standard-E Unit <1000 MBH	Commercial - Existing	Prescriptive	ROB	16%	0.2	20	$3.4	74%	68.7%	49.4%	3.7	30,991	619,824	7,139	372,359	6,620	268,066
11	Space Heating	Furnaces	Commercial - Existing	Custom	ROB	30%	0.5	20	$7.0	64%	68.7%	44.5%	3.9	12,921	258,423	2,059	148,431	1,999	96,749
12	Space Heating	Gas Furnace or RTU Tune-Up 40-299 MBH Replacing No Maintenance	Commercial - Existing	Prescriptive	Retrofit	2%	6.4	2	$190.9	25%	68.7%	84.0%	0.6	8,651	17,303	0	15,015	0	15,214
13	Space Heating	Gas Furnace or RTU Tune-Up ≥300 MBH Replacing No Maintenance	Commercial - Existing	Prescriptive	Retrofit	2%	10.7	2	$319.6	25%	68.7%	84.0%	0.6	8,651	17,303	0	15,015	0	15,214
14	Space Heating	Custom RCx Project - Furnace	Commercial - Existing	Custom	Retrofit	20%	375.0	5	$6,000.0	63%	68.7%	44.5%	1.2	61,598	307,989	10,142	218,574	9,976	143,334
15	Space Heating	Duct sealing	Commercial - Existing	Custom	Retrofit	5%	0.1	18	$7.7	19%	68.7%	51.0%	3.6	13,152	236,738	6,416	166,156	5,822	126,600
16	Space Heating	(>85% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Commercial - Existing	Prescriptive	ROB	8%	0.1	20	$2.4	63%	68.7%	37.9%	2.9	6,000	120,004	1,850	74,832	1,556	43,092
17	Space Heating	(>93% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Commercial - Existing	Prescriptive	ROB	16%	0.2	20	$3.4	74%	68.7%	49.4%	3.7	11,769	235,386	2,711	141,408	2,514	101,801
18	Space Heating	Boilers	Commercial - Existing	Custom	ROB	38%	0.6	20	$6.0	97%	68.7%	54.7%	3.9	6,325	126,491	652	68,960	505	50,002
19	Space Heating	Boiler - Combustion Controls Per kBtu controlled Replacing No Controls	Commercial - Existing	Prescriptive	Retrofit	1%	0.0	10	$0.9	12%	68.7%	27.7%	3.1	4,014	40,144	937	27,932	775	11,335
20	Space Heating	Boiler Draft Damper Replacing No Damper	Commercial - Existing	Prescriptive	Retrofit	5%	100.0	12	$150.0	97%	68.7%	75.0%	18.1	5,055	60,664	3,843	46,121	3,653	46,440
21	Space Heating	Boiler Hot Water Lockout/Reset Replacing No Maintenance	Commercial - Existing	Prescriptive	Retrofit	8%	0.1	20	$1.2	94%	68.7%	54.7%	3.4	7,251	145,014	1,173	84,518	822	62,028
22	Space Heating	Boiler Reset Controls (REMOVE)	Commercial - Existing	Custom	Retrofit	8%	50.9	20	$612.0	83%	68.7%	49.4%	3.9	0	0	0	0	0	0
23	Space Heating	Boiler Tune-Up 100-499 MBH Replacing No Maintenance	Commercial - Existing	Prescriptive	Retrofit	2%	7.6	5	$850.0	7%	68.7%	84.0%	1.6	766	3,830	656	3,278	624	3,306
24	Space Heating	Boiler Tune-Up 500-1199 MBH Replacing No Maintenance	Commercial - Existing	Prescriptive	Retrofit	2%	19.0	5	$850.0	16%	68.7%	84.0%	1.6	766	3,830	656	3,278	624	3,306
25	Space Heating	Boiler Tune-Up ≥1200 MBH Replacing No Maintenance	Commercial - Existing	Prescriptive	Retrofit	2%	37.9	5	$850.0	34%	68.7%	84.0%	1.6	766	3,830	656	3,278	624	3,306
26	Space Heating	Custom RCx Project -Boiler	Commercial - Existing	Custom	Retrofit	20%	625.0	5	$10,000.0	63%	68.7%	44.5%	1.2	22,119	110,595	3,592	77,407	2,728	50,518
27	Space Heating	Pipe Insulation	Commercial - Existing	Custom	Retrofit	67%	0.1	10	$14.0	8%	68.7%	40.0%	2.2	5,699	56,986	2,275	39,983	1,926	23,519
28	Space Heating	Steam Pipe Insulation - Small (<1.0" Diameter) Replacing No Insulation	Commercial - Existing	Prescriptive	Retrofit	67%	0.2	15	$14.0	7%	68.7%	40.0%	6.6	3,799	56,986	1,516	39,744	1,480	23,519
29	Space Heating	Steam Pipe Insulation - Medium (1" - 2" Diameter) Replacing No Insulation	Commercial - Existing	Prescriptive	Retrofit	67%	0.5	15	$14.0	21%	68.7%	40.0%	4.8	3,799	56,986	1,516	39,744	1,480	23,519
30	Space Heating	Steam Pipe Insulation - Large (2"-3" Diameter) Replacing No Insulation	Commercial - Existing	Prescriptive	Retrofit	67%	0.7	15	$14.0	32%	68.7%	40.0%	4.8	3,799	56,986	1,516	39,744	1,480	23,519
31	Space Heating	Commercial Heating Steam Trap Replacing Failed Steam Trap	Commercial - Existing	Prescriptive	ROB	27%	8.4	6	$77.0	95%	68.7%	76.0%	1.6	1,263	7,576	985	5,909	943	5,996
32	Space Heating	Dry Cleaning Steam Trap Replacing Failed Steam Trap	Commercial - Existing	Prescriptive	ROB	27%	13.1	6	$77.0	95%	68.7%	54.7%	2.5	574	3,447	18	2,430	11	1,900
33	Space Heating	Infrared Heater Replacing Std. Space Heater	Commercial - Existing	Prescriptive	ROB	11%	23.2	15	$920.0	29%	68.7%	27.7%	2.7	0	0	0	0	0	0
34	Space Heating	Radiant heater replacing direct fired MUA unit	Commercial - Existing	Custom	ROB	15%	1.2	15	$10.7	100%	68.7%	54.7%	3.5	0	0	0	0	0	0
35	Space Heating	Custom RCx Project - Other	Commercial - Existing	Custom	Retrofit	20%	312.5	5	$5,000.0	63%	68.7%	44.5%	1.2	0	0	0	0	0	0
36	Space Heating	Building Operator Certification (COMPETES WITH RCx)	Commercial - Existing	Custom	Retrofit	11%	156.4	5	$1,200.0	100%	68.7%	54.7%	1.5	83,151	415,753	2,776	308,472	765	245,209
37	Space Heating	Ceiling Insulation	Commercial - Existing	Custom	Retrofit	5%	11.6	30	$600.0	19%	68.7%	27.7%	5.1	2,499	49,984	281	29,739	213	12,713
38	Space Heating	Roof Insulation	Commercial - Existing	Custom	Retrofit	8%	0.2	30	$7.4	26%	68.7%	27.7%	5.1	4,443	88,861	500	52,869	379	22,601
39	Space Heating	Wall Insulation	Commercial - Existing	Custom	Retrofit	2%	88.5	30	$100.0	100%	68.7%	54.7%	44.7	4,659	93,178	314	52,257	183	36,626
40	Space Heating	Window insulation kits	Commercial - Existing	Custom	Retrofit	5%	6.8	1	$125.0	55%	68.7%	38.0%	0.2	81,346	81,346	0	0	0	0
41	Space Heating	Ventilation	Commercial - Existing	Custom	Retrofit	5%	32.0	10	$515.0	62%	68.7%	44.5%	2.2	8,287	82,866	279	60,995	63	35,844
42	Space Heating	Smart Thermostat - NG Replacing No programmable/Manual Thermostat	Commercial - Existing	Prescriptive	Retrofit	8%	0.0	10	$0.2	50%	68.7%	49.4%	8.3	20,420	204,205	5,225	155,813	5,092	117,694
43	Space Heating	EMS/Controls - Natural Gas	Commercial - Existing	Custom	Retrofit	5%	13.0	5	$185.0	70%	68.7%	44.5%	1.2	40,800	204,002	7,223	155,658	7,368	105,869
44	Space Heating	HVAC Occ Sensor	Commercial - Existing	Custom	Retrofit	5%	4.9	15	$500.0	10%	68.7%	27.7%	3.1	12,155	182,326	417	122,007	59	40,563
45	Space Heating	Destratification Fan	Commercial - Existing	Custom	Retrofit	23%	142.8	15	$375.0	100%	68.7%	54.7%	12.0	23,141	347,109	808	236,298	228	157,127
46	Space Heating	NC - Boilers	Commercial - Existing	NC	NC	38%	0.4	20	$4.3	82%	68.7%	49.4%	3.9	0	0	0	0	0	0
47	Space Heating	NC - Furnaces	Commercial - Existing	NC	NC	30%	0.5	20	$5.5	97%	68.7%	54.7%	3.9	0	0	0	0	0	0
48	Space Heating	NC - Whole Building Design - Natural Gas	Commercial - Existing	NC	NC	20%	500.0	10	$6,000.0	83%	68.7%	49.4%	2.2	0	0	0	0	0	0
49	Space Heating	NC - EMS - Natural Gas	Commercial - Existing	NC	NC	20%	26.3	10	$300.0	88%	68.7%	49.4%	2.2	0	0	0	0	0	0
50	Water Heating	Water Heater - EF ≥0.80 Replacing Water Heater - EF <0.80	Commercial - Existing	Prescriptive	ROB	29%	10.4	12	$300.0	25%	68.7%	34.0%	3.6	55,356	664,274	12,751	454,900	11,349	225,590
51	Water Heating	DHW Boiler Tune-Up	Commercial - Existing	Custom	Retrofit	3%	1.3	3	$0.8	100%	68.7%	84.0%	11.1	0	0	0	0	0	0
52	Water Heating	Drain Water Heat Recovery Water Heater	Commercial - Existing	Custom	Retrofit	20%	968.3	20	$150,000.0	6%	68.7%	27.7%	3.9	2,844	56,876	97	30,053	14	10,145
53	Water Heating	Pipe Insulation - Hot Water	Commercial - Existing	Custom	Retrofit	4%	0.6	15	$9.0	66%	68.7%	44.5%	3.1	3,290	49,345	113	33,115	114	21,374
54	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - High Temp/Gas Heat	Commercial - Existing	Prescriptive	ROB	44%	67.7	20	$970.0	67%	68.7%	53.0%	4.1	840	16,804	369	12,143	337	10,353
55	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - Low Temp /Gas Heat	Commercial - Existing	Prescriptive	ROB	48%	78.7	20	$970.0	77%	68.7%	53.0%	4.1	911	18,222	400	13,168	365	11,226
56	Water Heating	ENERGY STAR Dishwasher - Single Tank Conv - High Temp / Gas Heat	Commercial - Existing	Prescriptive	ROB	20%	17.8	20	$2,050.0	6%	68.7%	53.0%	5.3	370	7,390	162	5,341	148	4,553
57	Water Heating	Low-Flow Faucet Aerator	Commercial - Existing	Custom	Retrofit	39%	0.7	10	$2.0	100%	68.7%	75.0%	7.6	0	0	0	0	0	0
58	Water Heating	Low-Flow Showerhead	Commercial - Existing	Custom	Retrofit	34%	0.3	10	$18.5	17%	68.7%	75.0%	2.2	0	0	0	0	0	0
59	Water Heating	NC - Water Heat	Commercial - Existing	NC	NC	25%	100.0	10	$1,200.0	83%	68.7%	49.4%	2.2	0	0	0	0	0	0
60	Pools	Hi-E Water/Pool Heater >80% AFUE Replacing <80% AFUE	Commercial - Existing	Prescriptive	ROB	7%	0.2	15	$3.8	59%	68.7%	44.5%	3.4	1,225	18,372	38	11,068	8	5,617
61	Pools	Solar Pool Heater	Commercial - Existing	Custom	Retrofit	8%	46.9	20	$26,400.0	2%	68.7%	27.7%	3.9	1,016	20,328	31	9,780	4	3,007
62	Pools	Pool Covers	Commercial - Existing	Custom	Retrofit	23%	0.1	10	$2.2	40%	68.7%	27.7%	2.2	6,219	62,185	198	43,272	27	15,507
63	Cooking	Convection Oven	Commercial - SBDI	Custom	ROB	16%	12.9	12	$1,113.0	12%	68.7%	62.0%	2.6	682	8,179	266	5,618	255	5,065
64	Cooking	Energy Star Combination Oven	Commercial - SBDI	Custom	ROB	28%	27.8	12	$2,125.0	13%	68.7%	27.7%	2.6	1,178	14,131	36	9,266	21	3,441
65	Cooking	Fryer	Commercial - SBDI	Custom	ROB	32%	50.8	12	$500.0	100%	68.7%	54.7%	2.7	6,401	76,812	198	50,368	52	33,224
66	Cooking	Griddle	Commercial - SBDI	Custom	ROB	11%	13.1	12	$2,090.0	6%	68.7%	27.7%	2.6	685	8,216	21	5,388	12	2,001
67	Cooking	Infrared Charbroiler	Commercial - SBDI	Custom	ROB	25%	113.2	12	$11,970.0	9%	68.7%	27.7%	2.6	854	10,250	26	6,721	15	2,496
68	Cooking	Infrared Upright Broiler	Commercial - SBDI	Custom	ROB	38%	93.7	12	$5,040.0	19%	68.7%	27.7%	2.6	1,290	15,477	40	10,149	23	3,769
69	Cooking	Steam Cooker	Commercial - SBDI	Custom	ROB	53%	105.4	12	$3,500.0	30%	68.7%	27.7%	2.6	1,111	13,333	34	8,743	19	3,247
70	Cooking	Kitchen	Commercial - SBDI	Custom	ROB	20%	70.0	8	$1,120.0	63%	68.7%	44.5%	1.8	5,461	43,687	169	29,870	36	17,618
71	Space Heating	(≥85% AFUE) Furnace or Unit Heater Replacing Standard-E Unit ≤1000 MBH	Commercial - SBDI	SBDI	ROB	8%	0.1	20	$1.4	89%	68.7%	45.4%	3.5	9,480	189,598	3,705	121,818	3,521	83,845
72	Space Heating	(≥93% AFUE) Furnace or Unit Heater Replacing Standard-E Unit <1000 MBH	Commercial - SBDI	SBDI	ROB	16%	0.2	20	$3.4	74%	68.7%	41.0%	3.7	21,675	433,496	8,471	278,525	8,109	176,132
73	Space Heating	Furnaces	Commercial - SBDI	Custom	ROB	30%	0.5	20	$7.0	64%	68.7%	44.5%	3.9	7,753	155,054	1,236	89,058	1,199	58,049
74	Space Heating	Gas Furnace or RTU Tune-Up 40-299 MBH Replacing No Maintenance	Commercial - SBDI	Prescriptive	Retrofit	2%	6.4	2	$190.9	25%	68.7%	84.0%	0.6	20,068	40,136	0	34,832	0	35,496

Appendix D: C&I Gas Measure Assumption Detail

														MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
75	Space Heating	Gas Furnace or RTU Tune-Up ≥300 MBH Replacing No Maintenance	Commercial - SBDI	Prescriptive	Retrofit	2%	10.7	2	$319.6	25%	68.7%	84.0%	0.6	20,068	40,136	0	34,832	0	35,496
76	Space Heating	Custom RCx Project - Furnace	Commercial - SBDI	Custom	Retrofit	20%	375.0	5	$6,000.0	63%	68.7%	44.5%	1.2	36,699	183,495	6,043	130,232	5,978	85,889
77	Space Heating	Duct sealing	Commercial - SBDI	Custom	Retrofit	5%	0.1	18	$7.7	19%	68.7%	51.0%	3.6	7,781	140,056	3,800	98,421	3,468	75,420
78	Space Heating	(>85% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Commercial - SBDI	SBDI	ROB	8%	0.1	20	$2.4	63%	68.7%	34.0%	2.9	3,600	72,002	1,407	46,262	1,224	24,481
79	Space Heating	(>93% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Commercial - SBDI	SBDI	ROB	16%	0.2	20	$3.4	74%	68.7%	41.0%	3.7	7,062	141,232	2,760	90,742	2,523	57,010
80	Space Heating	Boilers	Commercial - SBDI	Custom	ROB	38%	0.6	20	$6.0	97%	68.7%	54.7%	3.9	3,795	75,895	391	41,376	303	30,001
81	Space Heating	Boiler - Combustion Controls Per kBtu controlled Replacing No Controls	Commercial - SBDI	Prescriptive	Retrofit	1%	0.0	10	$0.9	12%	68.7%	27.7%	3.1	2,409	24,086	562	16,746	465	6,805
82	Space Heating	Boiler Draft Damper Replacing No Damper	Commercial - SBDI	Prescriptive	Retrofit	5%	100.0	12	$150.0	97%	68.7%	75.0%	18.1	3,033	36,398	2,304	27,651	2,193	27,880
83	Space Heating	Boiler Hot Water Lockout/Reset Replacing No Maintenance	Commercial - SBDI	Prescriptive	Retrofit	8%	0.1	20	$1.2	94%	68.7%	54.7%	3.4	4,350	87,009	703	50,671	494	37,239
84	Space Heating	Boiler Reset Controls (REMOVE)	Commercial - SBDI	Custom	Retrofit	8%	50.9	20	$612.0	83%	68.7%	49.4%	3.9	4,495	89,909	282	46,849	143	28,686
85	Space Heating	Boiler Tune-Up 100-499 MBH Replacing No Maintenance	Commercial - SBDI	SBDI	Retrofit	2%	7.6	5	$850.0	7%	68.7%	84.0%	1.6	694	3,470	596	2,982	603	3,017
86	Space Heating	Boiler Tune-Up 500-1199 MBH Replacing No Maintenance	Commercial - SBDI	SBDI	Retrofit	2%	19.0	5	$850.0	16%	68.7%	84.0%	1.6	694	3,470	596	2,982	603	3,017
87	Space Heating	Boiler Tune-Up ≥1200 MBH Replacing No Maintenance	Commercial - SBDI	SBDI	Retrofit	2%	37.9	5	$850.0	34%	68.7%	84.0%	1.6	694	3,470	596	2,982	603	3,017
88	Space Heating	Custom RCx Project -Boiler	Commercial - SBDI	Custom	Retrofit	20%	625.0	5	$10,000.0	63%	68.7%	44.5%	1.2	13,816	69,080	2,253	48,550	1,717	31,792
89	Space Heating	Pipe Insulation	Commercial - SBDI	Custom	Retrofit	67%	0.1	10	$14.0	8%	68.7%	40.0%	2.2	3,608	36,079	1,446	25,423	1,229	15,007
90	Space Heating	Steam Pipe Insulation - Small (<1.0" Diameter) Replacing No Insulation	Commercial - SBDI	SBDI	Retrofit	67%	0.2	15	$14.0	7%	68.7%	40.0%	6.6	2,405	36,079	1,157	25,360	1,000	15,007
91	Space Heating	Steam Pipe Insulation - Medium (1" - 2" Diameter) Replacing No Insulation	Commercial - SBDI	SBDI	Retrofit	67%	0.5	15	$14.0	21%	68.7%	40.0%	4.8	2,405	36,079	1,157	25,360	1,000	15,007
92	Space Heating	Steam Pipe Insulation - Large (2"-3" Diameter) Replacing No Insulation	Commercial - SBDI	SBDI	Retrofit	67%	0.7	15	$14.0	32%	68.7%	40.0%	4.8	2,405	36,079	1,157	25,360	1,000	15,007
93	Space Heating	Commercial Heating Steam Trap Replacing Failed Steam Trap	Commercial - SBDI	SBDI	ROB	27%	8.4	6	$77.0	95%	68.7%	76.0%	1.6	1,934	11,604	1,516	9,093	1,544	9,262
94	Space Heating	Dry Cleaning Steam Trap Replacing Failed Steam Trap	Commercial - SBDI	SBDI	ROB	27%	13.1	6	$77.0	95%	68.7%	45.4%	2.5	341	2,044	36	1,448	33	974
95	Space Heating	Infrared Heater Replacing Std. Space Heater	Commercial - SBDI	Prescriptive	ROB	11%	23.2	15	$920.0	29%	68.7%	27.7%	2.7	0	0	0	0	0	0
96	Space Heating	Radiant heater replacing direct fired MUA unit	Commercial - SBDI	Custom	ROB	15%	1.2	15	$10.7	100%	68.7%	54.7%	3.5	0	0	0	0	0	0
97	Space Heating	Custom RCx Project - Other	Commercial - SBDI	Custom	Retrofit	20%	312.5	5	$5,000.0	63%	68.7%	44.5%	1.2	0	0	0	0	0	0
98	Space Heating	Building Operator Certification (COMPETES WITH RCx)	Commercial - SBDI	Custom	Retrofit	11%	156.4	5	$1,200.0	100%	68.7%	54.7%	1.5	46,003	230,017	1,548	171,996	431	138,153
99	Space Heating	Ceiling Insulation	Commercial - SBDI	Custom	Retrofit	5%	11.6	30	$600.0	19%	68.7%	27.7%	5.1	1,776	35,510	201	21,282	154	9,191
100	Space Heating	Roof Insulation	Commercial - SBDI	Custom	Retrofit	8%	0.2	30	$7.4	26%	68.7%	27.7%	5.1	2,592	51,832	294	31,064	225	13,415
101	Space Heating	Wall Insulation	Commercial - SBDI	Custom	Retrofit	2%	88.5	30	$100.0	100%	68.7%	54.7%	44.7	2,718	54,350	185	30,705	108	21,740
102	Space Heating	Window insulation kits	Commercial - SBDI	Custom	Retrofit	5%	6.8	1	$125.0	55%	68.7%	38.0%	0.2	47,450	47,450	0	0	0	0
103	Space Heating	Ventilation	Commercial - SBDI	Custom	Retrofit	5%	32.0	10	$515.0	62%	68.7%	44.5%	2.2	4,834	48,342	164	35,841	37	21,277
104	Space Heating	Smart Thermostat - NG Replacing No programmable/Manual Thermostat	Commercial - SBDI	SBDI	Retrofit	8%	0.0	10	$0.2	50%	68.7%	41.0%	8.3	11,901	119,014	5,206	91,509	5,292	58,028
105	Space Heating	EMS/Controls - Natural Gas	Commercial - SBDI	Custom	Retrofit	5%	13.0	5	$185.0	70%	68.7%	44.5%	1.2	15,769	78,847	2,813	60,624	2,900	41,665
106	Space Heating	HVAC Occ Sensor	Commercial - SBDI	Custom	Retrofit	5%	4.9	15	$500.0	10%	68.7%	27.7%	3.1	6,730	100,949	233	68,072	33	22,869
107	Space Heating	Destratification Fan	Commercial - SBDI	Custom	Retrofit	23%	142.8	15	$375.0	100%	68.7%	54.7%	12.0	13,780	206,705	484	141,482	138	95,033
108	Space Heating	NC - Boilers	Commercial - SBDI	NC	NC	38%	0.4	20	$4.3	82%	68.7%	49.4%	3.9	0	0	0	0	0	0
109	Space Heating	NC - Furnaces	Commercial - SBDI	NC	NC	30%	0.5	20	$5.5	97%	68.7%	54.7%	3.9	0	0	0	0	0	0
110	Space Heating	NC - Whole Building Design - Natural Gas	Commercial - SBDI	NC	NC	20%	500.0	10	$6,000.0	83%	68.7%	49.4%	2.2	0	0	0	0	0	0
111	Space Heating	NC - EMS - Natural Gas	Commercial - SBDI	NC	NC	20%	26.3	10	$300.0	88%	68.7%	49.4%	2.2	0	0	0	0	0	0
112	Water Heating	Water Heater - EF ≥0.80 Replacing Water Heater - EF <0.80	Commercial - SBDI	Prescriptive	ROB	29%	10.4	12	$300.0	25%	68.7%	34.0%	3.6	26,411	316,931	6,084	217,037	5,415	107,631
113	Water Heating	DHW Boiler Tune-Up	Commercial - SBDI	Custom	Retrofit	3%	1.3	3	$0.8	100%	68.7%	84.0%	11.1	1,421	4,263	1,194	3,581	720	3,581
114	Water Heating	Drain Water Heat Recovery Water Heater	Commercial - SBDI	Custom	Retrofit	20%	968.3	20	$150,000.0	6%	68.7%	27.7%	3.9	1,932	38,631	64	19,965	9	6,599
115	Water Heating	Pipe Insulation - Hot Water	Commercial - SBDI	Custom	Retrofit	4%	0.6	15	$9.0	66%	68.7%	44.5%	3.1	2,188	32,816	74	21,560	73	13,634
116	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - High Temp/Gas Heat	Commercial - SBDI	Prescriptive	ROB	44%	67.7	20	$970.0	67%	68.7%	53.0%	4.1	533	10,661	229	7,546	205	6,305
117	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - Low Temp /Gas Heat	Commercial - SBDI	Prescriptive	ROB	48%	78.7	20	$970.0	77%	68.7%	53.0%	4.1	578	11,560	249	8,182	222	6,836
118	Water Heating	ENERGY STAR Dishwasher - Single Tank Conv - High Temp / Gas Heat	Commercial - SBDI	Prescriptive	ROB	20%	17.8	20	$2,050.0	6%	68.7%	53.0%	5.3	474	9,477	204	6,708	182	5,604
119	Water Heating	Low-Flow Faucet Aerator	Commercial - SBDI	Custom	Retrofit	39%	0.7	10	$2.0	100%	68.7%	75.0%	7.6	7,246	72,462	5,834	58,339	3,782	62,712
120	Water Heating	Low-Flow Showerhead	Commercial - SBDI	Custom	Retrofit	34%	0.3	10	$18.5	17%	68.7%	75.0%	2.2	821	8,212	661	6,611	429	7,107
121	Water Heating	NC - Water Heat	Commercial - SBDI	NC	NC	25%	100.0	10	$1,200.0	83%	68.7%	49.4%	2.2	0	0	0	0	0	0
122	Pools	Hi-E Water/Pool Heater >80% AFUE Replacing <80% AFUE	Commercial - SBDI	Prescriptive	ROB	7%	0.2	15	$3.8	59%	68.7%	44.5%	3.4	735	11,023	23	6,641	5	3,370
123	Pools	Solar Pool Heater	Commercial - SBDI	Custom	Retrofit	8%	46.9	20	$26,400.0	2%	68.7%	27.7%	3.9	610	12,197	19	5,868	3	1,804
124	Pools	Pool Covers	Commercial - SBDI	Custom	Retrofit	23%	0.1	10	$2.2	40%	68.7%	27.7%	2.2	3,338	33,384	106	23,230	15	8,325
125	Cooking	Convection Oven	Commercial - NC	Custom	ROB	16%	12.9	12	$1,113.0	12%	68.7%	27.7%	2.6	409	4,905	13	3,217	2	1,076
126	Cooking	Energy Star Combination Oven	Commercial - NC	Custom	ROB	28%	27.8	12	$2,125.0	13%	68.7%	27.7%	2.6	541	6,498	17	4,261	2	1,425
127	Cooking	Fryer	Commercial - NC	Custom	ROB	32%	50.8	12	$500.0	100%	68.7%	54.7%	2.7	2,943	35,320	91	23,161	24	15,277
128	Cooking	Griddle	Commercial - NC	Custom	ROB	11%	13.1	12	$2,090.0	6%	68.7%	27.7%	2.6	315	3,778	10	2,477	1	828
129	Cooking	Infrared Charbroiler	Commercial - NC	Custom	ROB	25%	113.2	12	$11,970.0	9%	68.7%	27.7%	2.6	393	4,713	12	3,091	2	1,034
130	Cooking	Infrared Upright Broiler	Commercial - NC	Custom	ROB	38%	93.7	12	$5,040.0	19%	68.7%	27.7%	2.6	593	7,117	18	4,667	2	1,561
131	Cooking	Steam Cooker	Commercial - NC	Custom	ROB	53%	105.4	12	$3,500.0	30%	68.7%	27.7%	2.6	511	6,131	16	4,020	2	1,344
132	Cooking	Kitchen	Commercial - NC	Custom	ROB	20%	70.0	8	$1,120.0	63%	68.7%	44.5%	1.8	2,511	20,089	78	13,735	17	8,102
133	Space Heating	(≥85% AFUE) Furnace or Unit Heater Replacing Standard-E Unit ≤1000 MBH	Commercial - NC	Prescriptive	ROB	8%	0.1	20	$1.4	89%	68.7%	54.7%	3.5	357	7,132	11	3,431	3	2,081
134	Space Heating	(≥93% AFUE) Furnace or Unit Heater Replacing Standard-E Unit <1000 MBH	Commercial - NC	Prescriptive	ROB	16%	0.2	20	$3.4	74%	68.7%	49.4%	3.7	736	14,725	23	7,084	5	3,886
135	Space Heating	Furnaces	Commercial - NC	Custom	ROB	30%	0.5	20	$7.0	64%	68.7%	44.5%	3.9	1,312	26,245	41	12,627	9	6,227
136	Space Heating	Gas Furnace or RTU Tune-Up 40-299 MBH Replacing No Maintenance	Commercial - NC	Prescriptive	Retrofit	2%	6.4	2	$190.9	25%	68.7%	27.7%	0.6	991	1,982	0	1,370	0	554
137	Space Heating	Gas Furnace or RTU Tune-Up ≥300 MBH Replacing No Maintenance	Commercial - NC	Prescriptive	Retrofit	2%	10.7	2	$319.6	25%	68.7%	27.7%	0.6	941	1,883	0	1,301	0	526
138	Space Heating	Custom RCx Project - Furnace	Commercial - NC	Custom	Retrofit	20%	375.0	5	$6,000.0	63%	68.7%	44.5%	1.2	3,502	17,512	109	12,103	24	7,555
139	Space Heating	Duct sealing	Commercial - NC	Custom	Retrofit	5%	0.1	18	$7.7	19%	68.7%	27.7%	3.6	726	13,065	23	6,971	3	2,163
140	Space Heating	(>85% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Commercial - NC	Prescriptive	ROB	8%	0.1	20	$2.4	63%	68.7%	37.9%	2.9	176	3,520	5	1,694	1	712
141	Space Heating	(>93% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Commercial - NC	Prescriptive	ROB	16%	0.2	20	$3.4	74%	68.7%	49.4%	3.7	328	6,560	10	3,156	2	1,731
142	Space Heating	Boilers	Commercial - NC	Custom	ROB	38%	0.6	20	$6.0	97%	68.7%	54.7%	3.9	793	15,863	25	7,632	7	4,628
143	Space Heating	Boiler - Combustion Controls Per kBtu controlled Replacing No Controls	Commercial - NC	Prescriptive	Retrofit	1%	0.0	10	$0.9	12%	68.7%	27.7%	3.1	136	1,362	4	922	1	324
144	Space Heating	Boiler Draft Damper Replacing No Damper	Commercial - NC	Prescriptive	Retrofit	5%	100.0	12	$150.0	97%	68.7%	54.7%	18.1	543	6,516	17	4,287	4	2,832
145	Space Heating	Boiler Hot Water Lockout/Reset Replacing No Maintenance	Commercial - NC	Prescriptive	Retrofit	8%	0.1	20	$1.2	94%	68.7%	54.7%	3.4	247	4,944	8	2,388	2	1,451
146	Space Heating	Boiler Reset Controls (REMOVE)	Commercial - NC	Custom	Retrofit	8%	50.9	20	$612.0	83%	68.7%	49.4%	3.9	247	4,944	8	2,388	2	1,312
147	Space Heating	Boiler Tune-Up 100-499 MBH Replacing No Maintenance	Commercial - NC	Prescriptive	Retrofit	2%	7.6	5	$850.0	7%	68.7%	27.7%	1.6	123	617	4	426	1	166
148	Space Heating	Boiler Tune-Up 500-1199 MBH Replacing No Maintenance	Commercial - NC	Prescriptive	Retrofit	2%	19.0	5	$850.0	16%	68.7%	27.7%	1.6	123	617	4	426	1	166

Appendix D: C&I Gas Measure Assumption Detail

														MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
149	Space Heating	Boiler Tune-Up ≥1200 MBH Replacing No Maintenance	Commercial - NC	Prescriptive	Retrofit	2%	37.9	5	$850.0	34%	68.7%	27.7%	1.6	130	649	4	448	1	174
150	Space Heating	Custom RCx Project -Boiler	Commercial - NC	Custom	Retrofit	20%	625.0	5	$10,000.0	63%	68.7%	44.5%	1.2	1,298	6,490	40	4,482	9	2,797
151	Space Heating	Pipe Insulation	Commercial - NC	Custom	Retrofit	67%	0.1	10	$14.0	8%	68.7%	27.7%	2.2	246	2,461	8	1,670	1	588
152	Space Heating	Steam Pipe Insulation - Small (<1.0" Diameter) Replacing No Insulation	Commercial - NC	Prescriptive	Retrofit	67%	0.2	15	$14.0	7%	68.7%	27.7%	6.6	164	2,461	5	1,491	1	473
153	Space Heating	Steam Pipe Insulation - Medium (1" - 2" Diameter) Replacing No Insulation	Commercial - NC	Prescriptive	Retrofit	67%	0.5	15	$14.0	21%	68.7%	27.7%	4.8	164	2,461	5	1,491	1	473
154	Space Heating	Steam Pipe Insulation - Large (2"-3" Diameter) Replacing No Insulation	Commercial - NC	Prescriptive	Retrofit	67%	0.7	15	$14.0	32%	68.7%	37.9%	4.8	164	2,461	5	1,491	1	647
155	Space Heating	Commercial Heating Steam Trap Replacing Failed Steam Trap	Commercial - NC	Prescriptive	ROB	27%	8.4	6	$77.0	95%	68.7%	54.7%	1.6	138	829	4	573	1	434
156	Space Heating	Dry Cleaning Steam Trap Replacing Failed Steam Trap	Commercial - NC	Prescriptive	ROB	27%	13.1	6	$77.0	95%	68.7%	54.7%	2.5	17	99	1	69	0	52
157	Space Heating	Infrared Heater Replacing Std. Space Heater	Commercial - NC	Prescriptive	ROB	11%	23.2	15	$920.0	29%	68.7%	27.7%	2.7	0	0	0	0	0	0
158	Space Heating	Radiant heater replacing direct fired MUA unit	Commercial - NC	Custom	ROB	15%	1.2	15	$10.7	100%	68.7%	54.7%	3.5	0	0	0	0	0	0
159	Space Heating	Custom RCx Project - Other	Commercial - NC	Custom	Retrofit	20%	312.5	5	$5,000.0	63%	68.7%	44.5%	1.2	0	0	0	0	0	0
160	Space Heating	Building Operator Certification (COMPETES WITH RCx)	Commercial - NC	Custom	Retrofit	11%	156.4	5	$1,200.0	100%	68.7%	54.7%	1.5	8,106	40,532	255	28,300	68	21,869
161	Space Heating	Ceiling Insulation	Commercial - NC	Custom	Retrofit	5%	11.6	30	$600.0	19%	68.7%	27.7%	5.1	101	2,018	3	990	0	308
162	Space Heating	Roof Insulation	Commercial - NC	Custom	Retrofit	8%	0.2	30	$7.4	26%	68.7%	27.7%	5.1	179	3,587	6	1,760	1	547
163	Space Heating	Wall Insulation	Commercial - NC	Custom	Retrofit	2%	88.5	30	$100.0	100%	68.7%	54.7%	44.7	193	3,860	6	1,894	2	1,161
164	Space Heating	Window insulation kits	Commercial - NC	Custom	Retrofit	5%	6.8	1	$125.0	55%	68.7%	37.9%	0.2	4,131	4,131	0	0	0	0
165	Space Heating	Ventilation	Commercial - NC	Custom	Retrofit	5%	32.0	10	$515.0	62%	68.7%	44.5%	2.2	285	2,848	9	1,959	2	1,115
166	Space Heating	Smart Thermostat - NG Replacing No programmable/Manual Thermostat	Commercial - NC	Prescriptive	Retrofit	8%	0.0	10	$0.2	50%	68.7%	49.4%	8.3	997	9,969	32	6,875	8	4,356
167	Space Heating	EMS/Controls - Natural Gas	Commercial - NC	Custom	Retrofit	5%	13.0	5	$185.0	70%	68.7%	44.5%	1.2	1,390	6,952	44	4,882	10	3,076
168	Space Heating	HVAC Occ Sensor	Commercial - NC	Custom	Retrofit	5%	4.9	15	$500.0	10%	68.7%	27.7%	3.1	374	5,607	12	3,453	2	1,106
169	Space Heating	Destratification Fan	Commercial - NC	Custom	Retrofit	23%	142.8	15	$375.0	100%	68.7%	54.7%	12.0	3,000	44,994	95	27,764	26	17,562
170	Space Heating	NC - Boilers	Commercial - NC	NC	NC	38%	0.4	20	$4.3	82%	68.7%	49.4%	3.9	25,047	500,939	774	241,010	186	132,189
171	Space Heating	NC - Furnaces	Commercial - NC	NC	NC	30%	0.5	20	$5.5	97%	68.7%	54.7%	3.9	41,439	828,787	1,281	398,744	340	241,822
172	Space Heating	NC - Whole Building Design - Natural Gas	Commercial - NC	NC	NC	20%	500.0	10	$6,000.0	83%	68.7%	49.4%	2.2	28,077	561,543	1,081	235,957	279	158,986
173	Space Heating	NC - EMS - Natural Gas	Commercial - NC	NC	NC	20%	26.3	10	$300.0	88%	68.7%	49.4%	2.2	22,462	449,235	1,008	220,039	267	152,270
174	Water Heating	Water Heater - EF ≥0.80 Replacing Water Heater - EF <0.80	Commercial - NC	Prescriptive	ROB	29%	10.4	12	$300.0	25%	68.7%	27.7%	3.6	1,743	20,919	54	13,717	7	4,587
175	Water Heating	DHW Boiler Tune-Up	Commercial - NC	Custom	Retrofit	3%	1.3	3	$0.8	100%	68.7%	54.7%	11.1	0	0	0	0	0	0
176	Water Heating	Drain Water Heat Recovery Water Heater	Commercial - NC	Custom	Retrofit	20%	968.3	20	$150,000.0	6%	68.7%	27.7%	3.9	1,064	21,285	33	10,344	5	3,221
177	Water Heating	Pipe Insulation - Hot Water	Commercial - NC	Custom	Retrofit	4%	0.6	15	$9.0	66%	68.7%	44.5%	3.1	161	2,409	5	1,489	1	773
178	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - High Temp/Gas Heat	Commercial - NC	Prescriptive	ROB	44%	67.7	20	$970.0	67%	68.7%	44.5%	4.1	606	12,115	19	5,991	4	3,026
179	Water Heating	ENERGY STAR Dishwasher - Multi-Tank Conv - Low Temp /Gas Heat	Commercial - NC	Prescriptive	ROB	48%	78.7	20	$970.0	77%	68.7%	49.4%	4.1	657	13,137	21	6,496	5	3,649
180	Water Heating	ENERGY STAR Dishwasher - Single Tank Conv - High Temp / Gas Heat	Commercial - NC	Prescriptive	ROB	20%	17.8	20	$2,050.0	6%	68.7%	27.7%	5.3	266	5,328	8	2,635	1	829
181	Water Heating	Low-Flow Faucet Aerator	Commercial - NC	Custom	Retrofit	39%	0.7	10	$2.0	100%	68.7%	54.7%	7.6	0	0	0	0	0	0
182	Water Heating	Low-Flow Showerhead	Commercial - NC	Custom	Retrofit	34%	0.3	10	$18.5	17%	68.7%	27.7%	2.2	0	0	0	0	0	0
183	Water Heating	NC - Water Heat	Commercial - NC	NC	NC	25%	100.0	10	$1,200.0	83%	68.7%	49.4%	2.2	9,130	182,602	282	61,592	68	38,570
184	Pools	Hi-E Water/Pool Heater >80% AFUE Replacing <80% AFUE	Commercial - NC	Prescriptive	ROB	7%	0.2	15	$3.8	59%	68.7%	44.5%	3.4	377	5,649	12	3,404	3	1,727
185	Pools	Solar Pool Heater	Commercial - NC	Custom	Retrofit	8%	46.9	20	$26,400.0	2%	68.7%	27.7%	3.9	313	6,251	10	3,007	1	925
186	Pools	Pool Covers	Commercial - NC	Custom	Retrofit	23%	0.1	10	$2.2	40%	68.7%	27.7%	2.2	1,690	16,903	54	11,831	7	4,256
187	Process - Industrial	Decrease Oven Exhaust Flow - 1000F to 1200F	Industrial	Custom	Retrofit	20%	0.2	15	$1.0	100%	68.7%	54.7%	5.8	1,941	29,117	60	17,542	16	10,947
188	Process - Industrial	Decrease Oven Exhaust Flow - 800F to 1000F	Industrial	Custom	Retrofit	20%	0.2	15	$1.0	100%	68.7%	54.7%	5.4	1,941	29,117	60	17,542	16	10,947
189	Process - Industrial	Decrease Oven Exhaust Flow - 600F to 800F	Industrial	Custom	Retrofit	20%	0.2	15	$1.0	100%	68.7%	54.7%	4.8	1,941	29,117	60	17,542	16	10,947
190	Process - Industrial	Decrease Oven Exhaust Flow - 400F to 600F	Industrial	Custom	Retrofit	20%	0.1	15	$1.0	100%	68.7%	54.7%	4.0	1,941	29,117	60	17,542	16	10,947
191	Process - Industrial	Decrease Oven Exhaust Flow - 200F to 400F	Industrial	Custom	Retrofit	20%	0.1	15	$1.0	87%	68.7%	49.4%	3.1	1,941	29,117	60	17,542	14	9,900
192	Process - Industrial	Process Dryer Exhaust Rate Control w/ Humidity Sensors	Industrial	Custom	Retrofit	20%	0.7	15	$2.0	100%	68.7%	54.7%	11.0	9,706	145,586	300	87,709	80	54,734
193	Process - Industrial	Process Boilers - Steam	Industrial	Custom	ROB	3%	0.1	20	$12.9	6%	68.7%	27.7%	3.9	1,163	23,253	533	18,454	453	9,258
194	Process - Industrial	Transport Membrane Condenser 80F	Industrial	Custom	ROB	2%	0.1	15	$18.0	8%	68.7%	27.7%	3.1	574	8,612	18	5,188	2	1,641
195	Process - Industrial	Transport Membrane Condenser 120F	Industrial	Custom	ROB	2%	0.2	15	$27.0	8%	68.7%	27.7%	3.1	574	8,612	18	5,188	2	1,641
196	Process - Industrial	Transport Membrane Condenser 200F	Industrial	Custom	ROB	2%	0.4	15	$36.0	10%	68.7%	27.7%	3.1	574	8,612	18	5,188	2	1,641
197	Process - Industrial	Automatic Boiler Blowdown	Industrial	Custom	Retrofit	2%	0.0	15	$0.0	100%	68.7%	54.7%	3.1	1,148	17,224	71	10,023	40	7,434
198	Process - Industrial	Process Boilers - Water	Industrial	Custom	ROB	4%	0.1	20	$11.1	11%	68.7%	27.7%	3.9	794	15,871	364	12,596	309	6,319
199	Process - Industrial	Process Boiler Stack Economizer 80F	Industrial	Custom	Retrofit	5%	0.1	15	$3.0	23%	68.7%	27.7%	3.1	1,823	27,340	56	16,471	32	5,982
200	Process - Industrial	Process Boiler Stack Economizer 120F	Industrial	Custom	Retrofit	5%	0.1	15	$4.5	23%	68.7%	27.7%	3.1	1,823	27,340	56	16,471	32	5,982
201	Process - Industrial	Process Boiler Stack Economizer 200F	Industrial	Custom	Retrofit	5%	0.2	15	$6.0	29%	68.7%	27.7%	3.1	1,823	27,340	56	16,471	32	5,982
202	Process - Industrial	Process Boiler Tune-ups	Industrial	Custom	Retrofit	2%	0.1	2	$0.9	100%	68.7%	54.7%	0.5	13,123	26,247	0	0	0	0
203	Process - Industrial	Tank Insulation (gas) 1" High-Temp	Industrial	Custom	Retrofit	15%	0.2	15	$1.9	100%	68.7%	54.7%	4.0	1,025	15,379	820	12,303	799	12,293
204	Process - Industrial	Tank Insulation (gas) 1" Low-Temp	Industrial	Custom	Retrofit	15%	0.1	15	$1.9	72%	68.7%	49.4%	3.1	1,025	15,379	820	12,303	799	12,293
205	Process - Industrial	Tank Insulation (gas) 2" High-Temp	Industrial	Custom	Retrofit	15%	0.3	15	$2.6	97%	68.7%	54.7%	3.1	1,025	15,379	820	12,303	799	12,293
206	Process - Industrial	Tank Insulation (gas) 2" Low-Temp	Industrial	Custom	Retrofit	15%	0.1	15	$2.6	55%	68.7%	37.9%	3.1	1,025	15,379	820	12,303	799	12,293
207	Process - Industrial	High Turndown Burner on Make-Up Air Unit - 50 hr/wk	Industrial	Custom	Retrofit	17%	0.2	20	$2.5	59%	68.7%	44.5%	3.9	5,307	106,140	164	51,066	83	27,508
208	Process - Industrial	High Turndown Burner on Make-Up Air Unit - 100 hr/wk	Industrial	Custom	Retrofit	17%	0.3	20	$2.5	100%	68.7%	54.7%	4.6	5,307	106,140	164	51,066	44	30,969
209	Process - Industrial	High Turndown Burner on Make-Up Air Unit - 168 hr/wk	Industrial	Custom	Retrofit	17%	0.4	20	$2.5	100%	68.7%	54.7%	5.7	5,307	106,140	164	51,066	44	30,969
210	Process - Industrial	Regenerative/Recuperative Thermal Oxidizer - 2 shift Retrofit	Industrial	Custom	Retrofit	18%	7.4	20	$30.0	100%	68.7%	54.7%	9.6	873	17,454	27	8,398	7	5,093
211	Process - Industrial	Regenerative/Recuperative Thermal Oxidizer - 3 shift Retrofit	Industrial	Custom	Retrofit	18%	9.8	20	$30.0	100%	68.7%	54.7%	12.7	873	17,454	27	8,398	7	5,093
212	Process - Industrial	Waste Heat Recovery - 2 Shift Operation 78% TE	Industrial	Custom	Retrofit	20%	0.1	15	$6.0	13%	68.7%	27.7%	3.1	1,640	24,606	624	10,168	576	8,851
213	Process - Industrial	Waste Heat Recovery - 2 Shift Operation 92% TE	Industrial	Custom	Retrofit	20%	0.1	15	$6.0	11%	68.7%	27.7%	3.1	1,640	24,606	624	10,168	576	8,851
214	Process - Industrial	Waste Heat Recovery Continuous Operation 78% TE	Industrial	Custom	Retrofit	20%	0.1	15	$6.0	22%	68.7%	27.7%	3.1	2,181	32,716	810	13,667	748	11,760
215	Process - Industrial	Waste Heat Recovery Continuous Operation 92% TE	Industrial	Custom	Retrofit	20%	0.1	15	$6.0	18%	68.7%	27.7%	3.1	1,920	28,799	750	11,752	691	10,368
216	Agriculture	Greenhouse Under-Floor/Under-Bench Hydronic Heating	Industrial	Custom	Retrofit	20%	0.3	20	$12.0	28%	68.7%	27.7%	3.9	0	0	0	0	0	0
217	Agriculture	Heat Curtains for Greenhouses	Industrial	Custom	ROB	35%	0.1	5	$2.5	52%	68.7%	37.9%	1.2	0	0	0	0	0	0
218	Agriculture	IR Film for Greenhouses	Industrial	Custom	Retrofit	25%	0.0	5	$0.1	100%	68.7%	54.7%	1.5	0	0	0	0	0	0
219	Agriculture	Other Industrial -Grain Dryer	Industrial	Custom	ROB	20%	0.3	15	$18.0	19%	68.7%	27.7%	3.1	0	0	0	0	0	0
220	Space Heating	(≥85% AFUE) Furnace or Unit Heater Replacing Standard-E Unit ≤1000 MBH	Industrial	Prescriptive	ROB	8%	0.1	20	$1.4	50%	68.7%	44.5%	6.2	2,699	53,977	278	25,719	244	18,376
221	Space Heating	(≥93% AFUE) Furnace or Unit Heater Replacing Standard-E Unit <1000 MBH	Industrial	Prescriptive	ROB	16%	0.2	20	$3.4	50%	68.7%	37.9%	5.5	5,294	105,876	545	50,448	542	32,340
222	Space Heating	Gas Furnace or RTU Tune-Up 40-299 MBH Replacing No Maintenance	Industrial	Prescriptive	Retrofit	2%	6.4	2	$190.9	50%	68.7%	27.7%	0.3	4,127	8,253	0	0	0	0

Appendix D: C&I Gas Measure Assumption Detail

														MWH	MWH	MWH	MWH	MWH	MWH
Measure #	End-Use	Measure Name	Forecast Group	Program Type	Replacement Type	% Gas Savings	Per Unit Gas Savings	EE EUL	Measure Cost	RAP Incentive (%)	MAP Adoption Rate	RAP Adoption Rate	UCT Score	Tech Potential in 2024	Tech Potential in 2043	MAP Potential in 2024	MAP Potential in 2043	RAP Potential in 2024	RAP Potential in 2043
223	Space Heating	Gas Furnace or RTU Tune-Up ≥300 MBH Replacing No Maintenance	Industrial	Prescriptive	Retrofit	2%	10.7	2	$319.6	50%	68.7%	27.7%	0.3	4,119	8,238	0	0	0	0
224	Space Heating	Custom RCx Project - Furnace	Industrial	Custom	Retrofit	20%	375.0	5	$6,000.0	63%	68.7%	44.5%	1.2	14,237	71,187	440	48,902	95	30,446
225	Space Heating	(>85% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Industrial	Prescriptive	ROB	8%	0.1	20	$2.4	50%	68.7%	37.9%	3.6	1,012	20,241	233	9,379	199	6,931
226	Space Heating	(>93% AFUE) Space Heating Boiler Replacing Standard-E Unit ≤1000 MBH	Industrial	Prescriptive	ROB	16%	0.2	20	$3.4	50%	68.7%	37.9%	5.5	1,985	39,703	457	18,397	390	13,595
227	Space Heating	Boiler - Combustion Controls Per kBtu controlled Replacing No Controls	Industrial	Prescriptive	Retrofit	1%	0.0	10	$0.9	50%	68.7%	27.7%	0.7	593	5,927	0	2,036	0	1,643
228	Space Heating	Boiler Draft Damper Replacing No Damper	Industrial	Prescriptive	Retrofit		100.0	12	$150.0	50%	68.7%	54.7%	35.0	0	0	0	0	0	0
229	Space Heating	Boiler Hot Water Lockout/Reset Replacing No Maintenance	Industrial	Prescriptive	Retrofit	8%	0.1	20	$1.2	50%	68.7%	44.5%	6.4	2,155	43,105	343	20,317	259	15,438
230	Space Heating	Boiler Tune-Up 100-499 MBH Replacing No Maintenance	Industrial	Prescriptive	Retrofit	2%	7.6	5	$850.0	50%	68.7%	27.7%	0.2	201	1,006	0	0	0	0
231	Space Heating	Boiler Tune-Up 500-1199 MBH Replacing No Maintenance	Industrial	Prescriptive	Retrofit	2%	19.0	5	$850.0	50%	68.7%	27.7%	0.5	201	1,006	0	0	0	0
232	Space Heating	Boiler Tune-Up ≥1200 MBH Replacing No Maintenance	Industrial	Prescriptive	Retrofit	2%	37.9	5	$850.0	50%	68.7%	37.9%	1.1	201	1,006	145	724	145	724
233	Space Heating	Custom RCx Project -Boiler	Industrial	Custom	Retrofit	20%	625.0	5	$10,000.0	63%	68.7%	44.5%	1.2	4,576	22,882	141	15,719	31	9,786
234	Space Heating	Pipe Insulation	Industrial	Custom	Retrofit	67%	0.1	10	$14.0	8%	68.7%	27.7%	2.2	862	8,621	403	9,711	344	3,448
235	Space Heating	Steam Pipe Insulation - Small (<1.0" Diameter) Replacing No Insulation	Industrial	Prescriptive	Retrofit	67%	0.2	15	$14.0	50%	68.7%	27.7%	0.9	575	8,621	0	1,974	0	3,448
236	Space Heating	Steam Pipe Insulation - Medium (1" - 2" Diameter) Replacing No Insulation	Industrial	Prescriptive	Retrofit	67%	0.5	15	$14.0	50%	68.7%	27.7%	2.1	575	8,621	269	7,652	230	3,448
237	Space Heating	Steam Pipe Insulation - Large (2"-3" Diameter) Replacing No Insulation	Industrial	Prescriptive	Retrofit	67%	0.7	15	$14.0	50%	68.7%	37.9%	3.1	575	8,621	269	7,652	230	3,448
238	Space Heating	Infrared Heater Replacing Std. Space Heater	Industrial	Prescriptive	ROB	11%	23.2	15	$920.0	50%	68.7%	27.7%	1.6	0	0	0	0	0	0
239	Space Heating	Smart Thermostat - NG Replacing No programmable/Manual Thermostat	Industrial	Prescriptive	Retrofit	8%	0.0	10	$0.2	50%	68.7%	49.4%	8.3	7,855	78,547	809	42,964	567	37,598
240	Space Heating	EMS/Controls - Natural Gas	Industrial	Custom	Retrofit	5%	13.0	5	$185.0	70%	68.7%	44.5%	1.2	12,565	62,826	388	43,158	84	26,870
241	Space Heating	Truck Loading Dock Seals - Existing but degrading seals	Industrial	Custom	Retrofit	1%	20.1	10	$2,857.0	7%	68.7%	27.7%	2.2	96	958	6	586	5	260
242	Space Heating	Truck Loading Dock Seals - Existing ramp brush	Industrial	Custom	Retrofit	1%	5.2	10	$780.0	7%	68.7%	27.7%	2.2	96	958	6	586	5	260
243	Space Heating	Truck Loading Dock Seals - No existing	Industrial	Custom	Retrofit	3%	40.2	10	$2,857.0	14%	68.7%	27.7%	2.2	287	2,874	18	1,759	16	781
244	Space Heating	Truck Loading Dock Seals - No ramp brush	Industrial	Custom	Retrofit	2%	26.2	10	$780.0	34%	68.7%	27.7%	2.2	192	1,916	12	1,173	11	521

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Demand Side Management Market Potential Study

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