

OFFICIAL
EXHIBIT

**SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC.
A CENTERPOINT ENERGY COMPANY
(VECTREN SOUTH)**

IURC CAUSE NO. 45387

**IURC
PETITIONER'S**
EXHIBIT NO. 3
11-12-20 JR
DATE REPORTER

**DIRECT TESTIMONY
OF
JEFFREY R. HUBER, MANAGING DIRECTOR,
GDS ASSOCIATES, INC.**

ON

**VECTREN SOUTH'S ENERGY EFFICIENCY MARKET POTENTIAL STUDY AND
INTEGRATED RESOURCE PLANNING
DEMAND SIDE MANAGEMENT INPUTS
2021-2023 DEMAND SIDE MANAGEMENT PLAN**

**SPONSORING PETITIONER'S EXHIBIT NO. 3,
ATTACHMENT JRH-1**

DIRECT TESTIMONY OF JEFFREY R. HUBER

I. INTRODUCTION

Q. Please state your name, title and business address.

A. My name is Jeffrey R. Huber. I am employed as a Managing Director, by GDS Associates, Inc. ("GDS"). My business address is 1850 Parkway Place, Suite 800, Marietta, Georgia 30067. I am submitting this testimony on behalf of Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc. ("Vectren South" or the "Company").

Q. Please describe GDS.

A. GDS is a multi-service consulting and engineering firm. Formed in 1986, GDS employs a staff of more than 175 in nine locations across the U.S. GDS offers information technology, market research, and statistical services to a broad client base of Electric, Gas, Water, and Wastewater Utilities.

Q. Please briefly describe your educational background and business experience.

A. I received Bachelor's degrees in Anthropology and Criminology from the University of Florida in May 2001. In May 2004, I was awarded a Master of Arts degree in Anthropology, with a graduate minor in Statistics, from the University of Tennessee.

Since joining GDS Associates in 2005, I have been involved primarily on planning and/or evaluation projects for energy efficiency and demand response programs for utility clients and/or state organizations. I have conducted energy efficiency potential market assessments in over a dozen states and across more than two dozen utility service areas focused across the Midwest, South, and Northeast. I have formally presented results from these market potential assessments in front of Commissions and Commission staff in Maine, Vermont, Michigan, and Pennsylvania. Specifically, in Indiana, I have led or been involved with the development and completion of energy efficiency and demand response potential studies for other utilities including Indianapolis Power and Light (2019), the

1 Northern Indiana Public Service Company (2018) and Hoosier Energy (2009).

2
3 In addition to market potential assessments, I have conducted market baseline
4 studies for residential market rate, residential low-income, and nonresidential
5 customers in several states, performed cost-effectiveness screening of utility
6 programs, and engaged in regulatory oversight of energy efficiency programs for
7 other organizations.

8
9 **Q. Are you a member of any professional organizations or have any additional**
10 **certifications?**

11 A. Yes, I am a member of the Association of Energy Service Professionals. I am also
12 a Certified Energy Manager (CEM), Certified Measurement and Verification
13 Professional (CMVP), and Building Simulation Energy Analyst (BESA) by the
14 Association of Energy Engineers. I regularly attend national Association of Energy
15 Services Professionals (AESP) and ACEEE (American Council for an Energy
16 Efficient Economy) energy efficiency conferences to keep abreast with emerging
17 energy efficiency technologies and best practices for potential study analyses.

18
19 **Q. What is the purpose of your testimony?**

20 A. The purpose of my testimony is to discuss the development of Vectren South's
21 Market Potential Study (MPS) and discuss the process used to develop costs and
22 savings of Vectren South's energy efficiency portfolio for use in the development
23 of the Company's Integrated Resource Plan ("IRP").

24
25 **Q. Are you sponsoring any attachments?**

26 A. Yes. I am sponsoring Petitioner's Exhibit No. 3, Attachment JRH-1, which is
27 Vectren South's 2020-2025 MPS.

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29
30 **II. MARKET POTENTIAL STUDY**

31
32 **Q. Please discuss the development of the MPS?**

1 A. The 2020-2025 MPS, shown as Petitioner's Exhibit No. 3, Attachment JRH-1, was
2 developed both to inform the IRP and support the development of a multi-year
3 DSM Action Plan for Vectren. The study included primary market research and a
4 comprehensive review of current program historical savings and projected energy
5 savings opportunities to develop estimates of technical, economic, and achievable
6 potential. The primary market research collected up-to-date C&I data for the
7 Vectren service area for the saturation of energy-using equipment, building
8 characteristics and the percent of energy using equipment that is already high
9 efficiency. Primary market research was also conducted to understand customer
10 willingness to participate in energy efficiency programs at different incentives
11 levels for targeted end-uses.

12
13 Technical potential is the maximum energy efficiency savings available, assuming
14 cost and market adoption of a technology are not a barrier. Economic potential is
15 the subset of technical potential that is cost effective, meaning the economic
16 benefit outweighs the cost. The economic potential is measured by the Utility Cost
17 Test (UCT), which considers the lifetime energy and capacity as benefits, and
18 utility incentives and direct install equipment expenses as the cost. While some
19 may contend that the full technical or economic potential should be provided as
20 the level of DSM options available in the IRP process, this ignores the fact that
21 100% of the customers would have to participate. This is not realistic as historical
22 evidence has shown that not all customers will adopt a given technology for
23 reasons that range from aesthetic preferences, lack of information about energy
24 efficiency measures, lack of access to capital to perceived comfort concerns.
25 Rather, the potential modeled in the IRP should reflect some consideration of
26 achievability.

27
28 To that end, achievable potential considers real-world barriers to encouraging end
29 users to adopt energy efficiency measures; the non-measure costs of delivering
30 programs (for administration, marketing, analysis, data tracking and reporting and
31 Evaluation Measurement & Verification (EM&V)); and the capability of programs
32 and administrators to boost program activity over time. Barriers include financial,
33 customer awareness and willingness to participate in programs, technical

1 constraints, and other barriers the "program intervention" is modeled to overcome.
2 Additional considerations include political and/or regulatory constraints. The
3 potential study evaluated two achievable potential scenarios:

4 1) **Maximum Achievable Potential** estimates achievable potential assuming
5 incentives paid to participants are set equal to 100% of measure incremental costs
6 and aggressive adoption rates.

7 2) **Realistic Achievable Potential** estimates achievable potential with
8 Vectren paying incentive levels (as a percent of incremental measure costs)
9 closely calibrated to historical levels but is not constrained by any previously
10 determined spending levels.

11
12 It is important to also note that the estimates of technical, economic, and
13 achievable potential considered in the MPS (and ultimately, in the IRP) exclude
14 potential savings from customers who are eligible and have chosen to actively opt-
15 out of participating in Vectren's energy efficiency programs. In the Vectren service
16 area, approximately 67% of C&I customers are eligible to opt-out, and nearly 76%
17 of eligible customers have chosen to do so. As a result, 51% of total C&I MWh
18 sales, or 77% of eligible C&I sales, have presently opted out of funding Vectren's
19 energy efficiency programs.¹

20
21 **Q. Is the development of the MPS consistent with industry best practice?**

22 A. Yes. Over the past two decades, GDS has completed over 85 energy efficiency
23 potential studies for utilities and government agencies. Many of these studies are
24 directly used for integrated resource planning and/or demand resource planning
25 purposes. For this Vectren Indiana potential study, GDS followed the methodology
26 presented in the National Action Plan for Energy Efficiency (NAPEE) November
27 2007 report titled "Guide to Conducting Energy Efficiency Potential Studies".
28 Wherever available, GDS used Vectren service area specific data for building
29 characteristics, energy using equipment saturation data, customer counts by
30 sector, Vectren Indiana forecast of MWh sales and peak load, electric avoided

¹ These percentages are calculated based on 2017 Vectren C&I customer data and 2017 billing history.

1 costs, line losses, planning reserve margin and other data. As added best practice,
2 Vectren and GDS routinely provided updates to the Vectren Oversight Board
3 (VOB) on assumptions and methodological considerations related to the MPS. All
4 related models and market research were provided to the VOB for review and
5 comment, and GDS made several updates to modeling inputs based on these
6 comments.

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9 **III. ENERGY EFFICIENCY COST PROJECTION IN VECTREN SOUTH'S 2019 IRP**

10
11 **Q. What is your understanding of EE modeling within the IRP?**

12 A. It is my understanding that under the IURC's proposed Rule 170 IAC 4-7-6(b) and
13 Ind. Code § 8-1-8.5-10 ("Section 10"), it is incumbent for electricity suppliers to
14 provide the IRP process with a set of DSM options that can be incorporated into
15 the development of a resource plan. The IURC's proposed Rule 170 IAC 4-7-6(b)
16 states:

17
18 "An electric utility shall consider alternative methods of meeting future
19 demand for electric service. A utility must consider a demand-side
20 resource, including innovative rate design, as a source of new supply in
21 meeting future electric service requirements. The utility shall consider a
22 comprehensive array of demand-side measures that provide an
23 opportunity for all ratepayers to participate in DSM, including low-income
24 residential ratepayers."
25

26 In addition, under Section 10, whether an electricity supplier's energy efficiency
27 plan is consistent with its IRP is a factor to be considered by the IURC in
28 determining the overall reasonableness of the plan. Taken together, these jointly
29 supportive requirements direct the electricity supplier to study, similar to supply
30 side resources, available DSM options that may be chosen by the IRP analytical
31 process in arriving at a resource plan. In other words, the level of DSM to be
32 pursued by the electricity supplier should be determined through the IRP process.

33
34 **Q. How much DSM was made available in Vectren South's 2019 IRP?**

1 A. Vectren South chose to make up to 1.75% of eligible retail sales available for
2 selection in the IRP process for each year beginning in 2021. Only low-income
3 energy efficiency was included in the IRP as a predetermined resource.
4

5 **Q. Why was 1.75% of eligible retail sales included as an option for selection in**
6 **the IRP model?**

7 A. For the DSM Reference case of the IRP analysis, Vectren used the 1.75% realistic
8 achievable potential identified in the 2020-2025 Market Potential Study as the
9 starting point for developing blocks of energy efficiency to be modeled in the IRP.
10

11 In addition, to allow DSM to be modeled as a selectable resource, costs associated
12 with delivering the modeled energy and demand savings were also included in the
13 IRP model. Again, the 2020-2025 Market Potential Study informed the estimated
14 costs related to the realistic achievable savings potential.
15

16 **Q. Were any adjustments made to the realistic achievable savings potential**
17 **from the 2020-2025 Market Potential Study before inclusion in the IRP**
18 **model?**

19 A. Yes. Two adjustments to the MPS' realistic achievable energy efficiency savings
20 potential were necessary prior to inclusion in the IRP.
21

22 The first adjustment converted the energy efficiency potential from gross savings
23 to net savings. It is appropriate to model net energy efficiency impacts in order to
24 remove MWh and MW impacts that would have occurred even in the absence of
25 Vectren's programs. Net savings were calculated by applying Vectren's most
26 recent (2017) program evaluation results and Net to Gross (NTG) ratios to the MPS
27 estimates of gross realistic achievable savings. Due to annual differences in the
28 mix of energy efficiency measures included in the realistic achievable potential, the
29 weighted average NTG ratio adjustment ranged from 0.84 to 0.88 across the 20-
30 year IRP analysis timeframe.
31

32 The second adjustment aligned the level of income-qualified (IQ) potential
33 identified in the realistic achievable potential with levels achieved historically by

1 Vectren. The MPS assumes Vectren pays the full cost for all possible income-
2 qualified potential savings, regardless of cost-effectiveness. However, this
3 produces an income-qualified budget that significantly outpaces historical
4 spending for the income-qualified sector and would create cross-subsidization
5 concerns across customer segments. As a result of aligning the income-qualified
6 sector spending in the IRP with recent historical levels, income-qualified
7 achievable savings were also scaled accordingly.

8
9 Table JRH-1 shows the realistic achievable potential (as a % of annual forecast
10 sales) identified in the MPS and the impacts on eligible MWh sales after applying
11 the two adjustments described above for the 2021-2026 time period. After the two
12 adjustments, the amount of annual potential typically ranged from 1.4% to 1.5% of
13 eligible retail sales during the period from 2021 to 2026.

14
15 **Table JRH-1 MPS Incremental Annual Realistic Achievable Potential (as a %**
16 **of annual eligible sales); Pre- and Post-Adjustments (2021-2026)**

	2021	2022	2023	2024	2025	2026
<i>MPS Realistic Achievable</i>	2.1%	2.0%	2.0%	2.0%	2.0%	2.0%
<i>Adj#1: Gross to Net</i>	1.8%	1.7%	1.8%	1.8%	1.7%	1.7%
<i>Adj#2: IQ Alignment</i>	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%

17
18 **Q. Were any adjustments made to the assumed costs related to the realistic**
19 **achievable savings potential from the 2020-2025 Market Potential Study,**
20 **before inclusion in the IRP model?**

21 **A.** Yes. The utility costs included in the 2020-2025 Market Potential Study include
22 utility incentive costs, program delivery costs, and other cross-cutting program
23 costs. In addition to the reduced budget associated with income-qualified (or low-
24 income) savings noted above, two modifications to the MPS cost estimates were
25 created to further align the IRP's DSM Reference Case with empirical Vectren
26 data. The first adjustment was to reduce incentive costs in the C&I sector from
27 2020 through 2027. This adjustment served to align the IRP modeled costs with
28 Vectren recent historical and 2019 planned costs in the C&I sector. The second
29 adjustment was to change the escalation rate for non-incentive program costs to

1 2.2% (in lieu of the 1.6% modeled in the MPS) to be consistent with other IRP
2 planning assumptions.²

3

4 **Q. Please describe how up to 1.75% of gross eligible sales could be selected in**
5 **the IRP?**

6 A. Following these savings and costs adjustments, a supply curve of the remaining
7 electric energy efficiency potential was developed for each year of the MPS. Each
8 supply curve represents a mix of both residential and non-residential measures.

9

10 A supply curve of energy efficiency potential is a device for demonstrating the total
11 amount of energy efficiency savings available at specific price points, with the x-
12 axis representing the cumulative annual energy savings available and the y-axis
13 representing the cost of saved energy. The energy efficiency supply curve is useful
14 in that it creates a logical order for pursuing energy efficiency measures based on
15 least cost planning.

16

17 To facilitate the IRP resource selection process, energy efficiency measures along
18 each year's supply curve were then bundled in blocks of approximately 0.25% net
19 energy savings relative to forecast sales. The total number of energy efficiency
20 blocks, each year, is dependent on the realistic achievable potential identified in
21 that year. For example, the realistic achievable potential identified in 2024 (after
22 the adjustments noted earlier) allows for 6 complete blocks of 0.25% net efficiency
23 savings, and a partial 7th block. Table JRH-2 represents the structure and the
24 sizes of the blocks.

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² Incentive costs were noted escalated in the MPS or IRP DSM inputs. Incentives (as a % of measure incremental costs) were held constant in nominal dollars.

1

Table JRH-2 DSM Resource Options Net of Free Riders

Year	Annual GWh Sales (net Opt- Outs)	Percentage of Eligible Sales Potential	Block	Block	Block	Block	Block	Block	Block	IQ
			1	2	3	4	5	6	7	
			<i>MWh Savings</i>							
2021	3,325	1.49%	8,244	8,352	8,169	8,393	7,287	8,182		780
2022	3,340	1.41%	7,781	8,900	8,160	7,508	5,541	8,595		718
2023	3,357	1.48%	8,196	8,512	8,448	7,503	8,605	7,880		659
2024	3,382	1.55%	8,358	7,980	8,960	8,382	8,397	8,018	1,717	548
2025	3,394	1.53%	8,455	8,513	8,319	8,399	7,986	8,982	849	517
2026	3,410	1.54%	8,226	8,748	8,527	8,194	7,932	9,444	935	491
2027	3,428	1.53%	8,439	8,619	8,327	8,793	7,143	9,745	950	464
2028	3,454	1.52%	8,357	8,618	8,391	8,094	7,427	10,900	279	458
2029	3,469	1.47%	8,558	8,061	8,915	9,066	8,006	7,779		457
2030	3,484	1.50%	8,693	8,714	8,650	8,587	8,906	8,301		473
2031	3,499	1.44%	8,577	8,889	7,140	9,534	9,222	6,614		458
2032	3,521	1.43%	8,705	8,879	8,714	8,821	8,089	6,736		505
2033	3,533	1.39%	8,800	8,861	8,470	9,091	8,933	4,440		510
2034	3,552	1.37%	8,880	8,766	8,854	8,848	8,940	3,940		591
2035	3,569	1.64%	8,795	9,041	8,912	8,719	9,132	8,790	4,640	542
2036	3,591	1.65%	8,894	8,913	8,969	9,065	9,017	8,841	5,096	515
2037	3,605	1.66%	8,481	9,426	9,038	8,808	9,273	8,907	5,412	638
2038	3,619	1.72%	8,523	9,106	9,501	8,919	9,185	8,358	8,124	601
2039	3,633	1.73%	8,618	9,326	9,214	9,078	8,221	9,705	8,170	593

2

3

Taking this over the 19-year horizon means that 124 incremental blocks of 0.25% each were available to be selected in the IRP process.³ From this structure, Vectren South expected that the appropriate IRP determined cost-effective level of EE would be identified.

7

8

Q. Why are the individual blocks of energy efficiency not equal?

9

A. Although each block was initially designed to be roughly equivalent to 0.25% of eligible retail sales, the savings attributable to each measure permutation included in the MPS can vary significantly. Rather than break up savings from an individual measure across different blocks, a new block of energy efficiency savings was created and started with the energy efficiency savings from the next measure along the annual supply curve. This method causes minor variation in savings across each block of DSM.

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³ The income-qualified/low-income DSM savings were treated as a predetermined amount and did not have to compete against supply-side resources.

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Q. Please describe whether the DSM resource options were net of free riders?

A. The table above provides 0.25% blocks of net impacts which already reflects an 84% to 88% adjustment for free riders. Free riders represent those participants that would have implemented the energy efficiency technology without the Company's programs.

Q. Please describe the development of the 8760 load shapes associated with the annual impacts shown in Table JRH-2.

A. Each annual block of energy efficiency noted in Table JRH-2 has a different heterogenous mix of residential and nonresidential measures. The assignment of the energy efficiency measures included in each annual block relied on the development of supply curves (described in more detail below). To facilitate modeling, residential measures were assigned to one of 4 potential broad end-use categories (i.e. lighting, cooling, heating and cooling, and other) while individual commercial measures were mapped to one of three end-use categories (i.e. lighting, HVAC, and other). Unique weighted average end-use load shapes were then calculated for each block of energy efficiency and for each year to reflect changes in energy efficiency measure mixes across each block and over time.

Q. How did GDS project the cost of DSM over the IRP horizon?

A. By virtue of the supply curve approach used to assign blocks of energy efficiency to be modeled as a selectable resource, the implied cost of each DSM block is also produced, with the cost of each subsequent block more costly than the previous block. As noted earlier, these costs (with minor modifications) are based on the estimated costs from the 2020-2025 MPS, as shown in Petitioner's Exhibit No. 3, Attachment JRH-1.

After accounting for each block's incremental savings and costs, as well as the weighted average measure life of each DSM block, the levelized cost per net lifetime-kWh saved of each DSM block was calculated. Table JRH-3 provides the estimated levelized costs, on a cumulative basis, for energy efficiency included in the IRP's DSM Reference Case. In 2023, the cumulative levelized cost of DSM is

1 estimated to be \$0.0394. This represents the assumed cost to achieve up to 1.5%
2 of retail sales in that year. The incremental cost of achieving block 6 (1.25%-1.5%)
3 alone is significantly higher. Empty cells reflect a lack of net achievable potential
4 (based on the MPS results) in that year.

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Table JRH-3 Utility Cost per Saved kWh

<i>Year</i>	<i>Block 1</i>	<i>Block 2</i>	<i>Block 3</i>	<i>Block 4</i>	<i>Block 5</i>	<i>Block 6</i>	<i>Block 7</i>	<i>IQ</i>
Cumulative Bin Net \$ per Levelized Lifetime kWh Saved								
2021	\$0.0154	\$0.0201	\$0.0232	\$0.0268	\$0.0314	\$0.0380		\$0.1448
2022	\$0.0154	\$0.0202	\$0.0245	\$0.0289	\$0.0326	\$0.0394		\$0.1594
2023	\$0.0158	\$0.0206	\$0.0246	\$0.0292	\$0.0342	\$0.0397		\$0.1754
2024	\$0.0162	\$0.0204	\$0.0247	\$0.0302	\$0.0355	\$0.0377	\$0.0412	\$0.1997
2025	\$0.0168	\$0.0217	\$0.0263	\$0.0321	\$0.0375	\$0.0410	\$0.0427	\$0.2134
2026	\$0.0172	\$0.0226	\$0.0278	\$0.0336	\$0.0391	\$0.0426	\$0.0446	\$0.2255
2027	\$0.0179	\$0.0237	\$0.0291	\$0.0357	\$0.0409	\$0.0442	\$0.0462	\$0.2429
2028	\$0.0185	\$0.0250	\$0.0311	\$0.0372	\$0.0426	\$0.0468	\$0.0485	\$0.2469
2029	\$0.0194	\$0.0262	\$0.0330	\$0.0399	\$0.0443	\$0.0499		\$0.2481
2030	\$0.0202	\$0.0283	\$0.0342	\$0.0402	\$0.0457	\$0.0521		\$0.2453
2031	\$0.0210	\$0.0294	\$0.0350	\$0.0423	\$0.0470	\$0.0531		\$0.2517
2032	\$0.0220	\$0.0304	\$0.0388	\$0.0443	\$0.0491	\$0.0557		\$0.2299
2033	\$0.0233	\$0.0317	\$0.0409	\$0.0478	\$0.0505	\$0.0574		\$0.2345
2034	\$0.0241	\$0.0328	\$0.0432	\$0.0497	\$0.0525	\$0.0596		\$0.2038
2035	\$0.0203	\$0.0262	\$0.0323	\$0.0405	\$0.0462	\$0.0480	\$0.0545	\$0.2285
2036	\$0.0206	\$0.0262	\$0.0320	\$0.0405	\$0.0456	\$0.0482	\$0.0547	\$0.2413
2037	\$0.0208	\$0.0264	\$0.0322	\$0.0399	\$0.0457	\$0.0485	\$0.0547	\$0.1969
2038	\$0.0218	\$0.0256	\$0.0324	\$0.0395	\$0.0450	\$0.0499	\$0.0558	\$0.2006
2039	\$0.0231	\$0.0262	\$0.0333	\$0.0398	\$0.0458	\$0.0506	\$0.0564	\$0.2068

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8 As a final step in the DSM Reference Case energy efficiency block development,
9 a single low-income ("LI") block of energy efficiency was created. As noted earlier,
10 this savings block is aligned so that total low-income spending in 2021-2039 is
11 consistent with recent historical levels (\$1.15 million annually). The cost per
12 lifetime kWh-saved is expected to change over time as the associated mix of low-
13 income measures in the realistic achievable potential changes. Annual savings
14 associated with the LI Block range from 780 MWh in the early years of the IRP to
15 a low of 457 MWh as the measure mix converts to higher \$/kWh measures over
16 time.

17

18 **Q. Given the uncertainty associated with long term energy efficiency costs, did**
19 **GDS consider developing sensitivities to assess the impact of higher or**

1 **lower EE costs?**

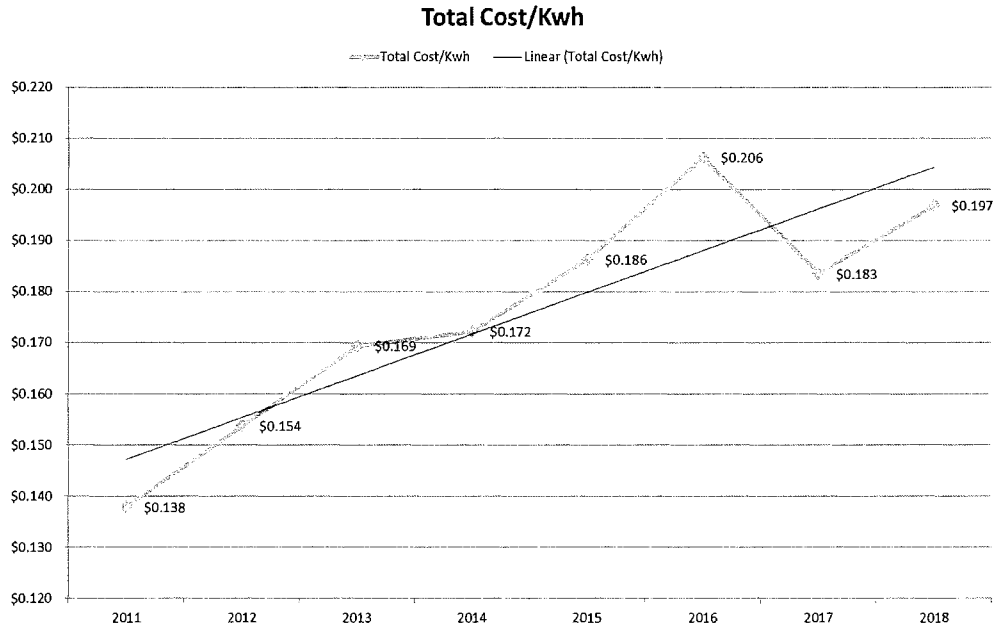
2 A. Yes, one should recognize that there is uncertainty associated with any forecast,
3 including a forecast of the cost to implement energy efficiency programs. The
4 previous discussion provided the Reference Case projection of DSM resource
5 costs. However, DSM resource costs are a key component to the integration of
6 DSM into the resource plan. Given the uncertainty around these costs, especially
7 considering a 20-year implementation period, alternate views of the costs should
8 be examined in the context of the scenario analyses.

9

10 To that end, high and low DSM resource cost trajectories were developed by
11 leveraging Vectren's 2011-2018 historical DSM spend per first-year kWh saved
12 and calculating one standard deviation from the mean to develop high and low
13 DSM spend scenarios. This approach uses the actual variation in Vectren's energy
14 efficiency resource acquisition costs to define upper and lower bounds on future
15 DSM costs per first-year kWh-saved. The result is an 11.9% increase or reduction
16 in estimated annual DSM costs relative to the IRP Base Case. Figure JRH-4 shows
17 the 2011-2018 average cost per first-year kWh-saved used to determine the IRP
18 sensitivities on DSM costs.

19

1 **Figure JRH-4 2011-2018 Vectren Portfolio Cost per 1st-Year kWh Saved**



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Applying a range of expected costs produces the following high (Table JRH-5) and low (Table JRH-6) tables of projected DSM resource costs.⁴

⁴ No IRP sensitivities for the income-qualified savings were included in the IRP Reference case as the IQ block was modeled as a predetermined, fixed load impact.

1 **Table JRH-5 High Case Cost per kWh: Plus One Standard Deviation**

<i>Year</i>	<i>Block 1</i>	<i>Block 2</i>	<i>Block 3</i>	<i>Block 4</i>	<i>Block 5</i>	<i>Block 6</i>	<i>Block 7</i>
Cumulative Bin Net \$ per Levelized Lifetime kWh Saved							
2021	\$0.0173	\$0.0225	\$0.0259	\$0.0300	\$0.0351	\$0.0426	
2022	\$0.0172	\$0.0226	\$0.0274	\$0.0323	\$0.0365	\$0.0440	
2023	\$0.0177	\$0.0230	\$0.0275	\$0.0326	\$0.0383	\$0.0444	
2024	\$0.0181	\$0.0229	\$0.0277	\$0.0338	\$0.0397	\$0.0421	\$0.0461
2025	\$0.0188	\$0.0242	\$0.0294	\$0.0359	\$0.0419	\$0.0458	\$0.0478
2026	\$0.0192	\$0.0253	\$0.0311	\$0.0376	\$0.0437	\$0.0476	\$0.0499
2027	\$0.0200	\$0.0265	\$0.0325	\$0.0399	\$0.0457	\$0.0495	\$0.0517
2028	\$0.0207	\$0.0280	\$0.0348	\$0.0416	\$0.0477	\$0.0524	\$0.0543
2029	\$0.0217	\$0.0293	\$0.0369	\$0.0446	\$0.0496	\$0.0559	
2030	\$0.0226	\$0.0317	\$0.0382	\$0.0450	\$0.0511	\$0.0582	
2031	\$0.0235	\$0.0329	\$0.0391	\$0.0473	\$0.0526	\$0.0594	
2032	\$0.0246	\$0.0341	\$0.0434	\$0.0496	\$0.0550	\$0.0624	
2033	\$0.0260	\$0.0355	\$0.0458	\$0.0535	\$0.0565	\$0.0642	
2034	\$0.0269	\$0.0367	\$0.0483	\$0.0556	\$0.0587	\$0.0667	
2035	\$0.0227	\$0.0293	\$0.0361	\$0.0453	\$0.0517	\$0.0537	\$0.0610
2036	\$0.0231	\$0.0293	\$0.0358	\$0.0453	\$0.0511	\$0.0539	\$0.0612
2037	\$0.0233	\$0.0295	\$0.0360	\$0.0446	\$0.0511	\$0.0543	\$0.0612
2038	\$0.0244	\$0.0287	\$0.0363	\$0.0442	\$0.0503	\$0.0558	\$0.0624
2039	\$0.0258	\$0.0293	\$0.0373	\$0.0445	\$0.0513	\$0.0567	\$0.0631

2

3 **Table JRH-6 Low Case Cost Per kWh: Minus One Standard Deviation**

<i>Year</i>	<i>Block 1</i>	<i>Block 2</i>	<i>Block 3</i>	<i>Block 4</i>	<i>Block 5</i>	<i>Block 6</i>	<i>Block 7</i>
Cumulative Bin Net \$ per Levelized Lifetime kWh Saved							
2021	\$0.0136	\$0.0177	\$0.0204	\$0.0236	\$0.0276	\$0.0335	
2022	\$0.0135	\$0.0178	\$0.0216	\$0.0254	\$0.0287	\$0.0347	
2023	\$0.0139	\$0.0181	\$0.0216	\$0.0257	\$0.0302	\$0.0350	
2024	\$0.0143	\$0.0180	\$0.0218	\$0.0266	\$0.0313	\$0.0332	\$0.0363
2025	\$0.0148	\$0.0191	\$0.0232	\$0.0282	\$0.0330	\$0.0361	\$0.0377
2026	\$0.0151	\$0.0199	\$0.0245	\$0.0296	\$0.0344	\$0.0375	\$0.0393
2027	\$0.0158	\$0.0209	\$0.0256	\$0.0314	\$0.0360	\$0.0389	\$0.0407
2028	\$0.0163	\$0.0220	\$0.0274	\$0.0328	\$0.0375	\$0.0412	\$0.0427
2029	\$0.0171	\$0.0231	\$0.0291	\$0.0351	\$0.0390	\$0.0440	
2030	\$0.0178	\$0.0250	\$0.0301	\$0.0354	\$0.0403	\$0.0459	
2031	\$0.0185	\$0.0259	\$0.0308	\$0.0373	\$0.0414	\$0.0468	
2032	\$0.0194	\$0.0268	\$0.0342	\$0.0391	\$0.0433	\$0.0491	
2033	\$0.0205	\$0.0279	\$0.0361	\$0.0421	\$0.0445	\$0.0506	
2034	\$0.0212	\$0.0289	\$0.0380	\$0.0438	\$0.0462	\$0.0525	
2035	\$0.0179	\$0.0231	\$0.0284	\$0.0357	\$0.0407	\$0.0423	\$0.0480
2036	\$0.0181	\$0.0231	\$0.0282	\$0.0356	\$0.0402	\$0.0425	\$0.0482
2037	\$0.0183	\$0.0232	\$0.0284	\$0.0351	\$0.0402	\$0.0428	\$0.0482
2038	\$0.0192	\$0.0226	\$0.0286	\$0.0348	\$0.0396	\$0.0439	\$0.0492
2039	\$0.0203	\$0.0231	\$0.0293	\$0.0350	\$0.0404	\$0.0446	\$0.0497

4

1 These high and low-cost projections were used in the scenario analyses in the
2 development of the IRP resource plan as covered in the testimony of Petitioner's
3 witness Peter Hubbard.

4

5 **Q. What improvements to DSM block modeling have been included in the plan?**

6 A. In the 2016 IRP DSM was modeled using equal blocks of DSM based on a
7 regression cost approach using EIA data per Vectren's DSM consultant in the 2018
8 – 2020 DSM plan. DSM block modeling has been updated to allow the MPS to
9 inform the amount of savings to be allocated to each block by assuring the least
10 cost measures fill the first block, assuring that least cost measures are selected
11 first. Further, bin specific load shapes have been included in the model to
12 differentiate between end use measures while also recognizing that blocks can
13 contain both residential and non-residential measures.

14

15 **Q. Is the development of the long-term cost analysis and bundle development
16 consistent with other IRP modeling you've experienced?**

17 A. Yes. GDS used a similar energy efficiency bundling approach for the development
18 of the Northern Indiana Public Service Company (NIPSCO) integrated resource
19 plan in 2018 as well as the Indianapolis Power and Light (IPL) integrated resource
20 plan in 2019. GDS has reviewed recent integrated resource plans of other utilities
21 that have used this approach.

22

23

24 **IV. CONCLUSION**

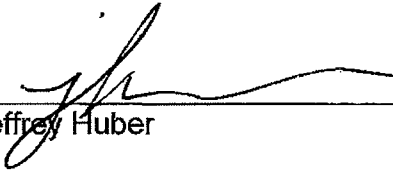
25

26 **Q. How do the results of this Vectren South electric energy efficiency potential
27 study compare to the results of other recent potential studies for other
28 utilities?**

29 A. The results of the Vectren South energy efficiency potential study are consistent
30 with the findings of other recent energy efficiency potential studies conducted in
31 Indiana and nearby states. Recent energy efficiency potential studies conducted
32 by GDS in Indiana and Michigan (which also utilized the UCT Test for economic
33 screening) all found that incremental annual electric energy efficiency potential

VERIFICATION

I, Jeffrey Huber, Managing Director, GDS Associates, Inc., affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.



Jeffrey Huber

Date: June 3, 2020



prepared for

VECTREN ENERGY DELIVERY OF INDIANA

*2020-2025 Integrated **Electric** DSM Market Potential Study & Action Plan*

FINAL REPORT

prepared by
GDS ASSOCIATES, INC.
EVI CONSULTING

EXECUTIVE SUMMARY

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- H Combined Gas & Electric Portfolio Summary
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Executive Summary

OBJECTIVES & SCOPE

This project included a demand-side management (DSM) Market Potential Study and Action Plan for Vectren Energy Delivery of Indiana ("Vectren"). The study included assessments of electric energy efficiency and demand response potential. The results of the potential study were leveraged to develop a DSM Action Plan for Vectren's 2020-2025 planning horizon. This report provides the results of the electric energy efficiency and demand response potential analysis.

The energy efficiency potential study assessed potential by customer segment (residential, commercial, and industrial – with and without opt-out customers). The effort included several preliminary tasks to assess the Vectren market and develop foundational assumptions about the customer base, sales forecasts, and savings opportunities to order to then assess the overall energy efficiency potential in the Vectren services territories.

APPROACH SUMMARY

The GDS team used a bottom-up approach to estimate energy efficiency potential in the residential sector. Bottom-up approaches begin with characterizing the eligible equipment stock, estimating savings and screening for cost-effectiveness first at the measure level, then summing savings at the end-use and service area levels. In the commercial and industrial sectors, GDS utilized the 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. The demand response potential assessment was conducted in a similar manner as the energy efficiency potential assessment. Below is the summary of the Maximum Achievable Potential (MAP), Realistic Achievable Potential (RAP) and Program Potential. More detail can be found in Section 1 of Volume I, Market Potential Study.

- *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, customer awareness and willingness to participate 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:
- *Maximum Achievable Potential* estimates achievable potential on paying incentives equal to 100% of measure incremental costs and aggressive adoption rates.
- *Realistic Achievable Potential* estimates achievable potential with Vectren 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.
- *Program Potential* refers to the efficiency potential possible given specific program funding levels and designs; in this study program potential is addressed by the DSM Action Plan, which further addresses issues such as market dynamics (net versus gross impacts), timeframe differences, proxy versus specific program delivery approaches, and budget realities.

RESULTS

Table ES-1 summarizes the electric energy-efficiency savings for all measures at the different levels of potential relative to the baseline forecast. This provides cumulative annual technical, economic, MAP and RAP, and program potential energy savings, in total MWh and as a percentage of the sector-level sales forecast. Note that the steps of measure bundling, program design and program delivery refine the RAP results later into the Program Potential. The cumulative RAP increases to 9% cumulative annual savings over the next six years. The RAP savings estimates have a large

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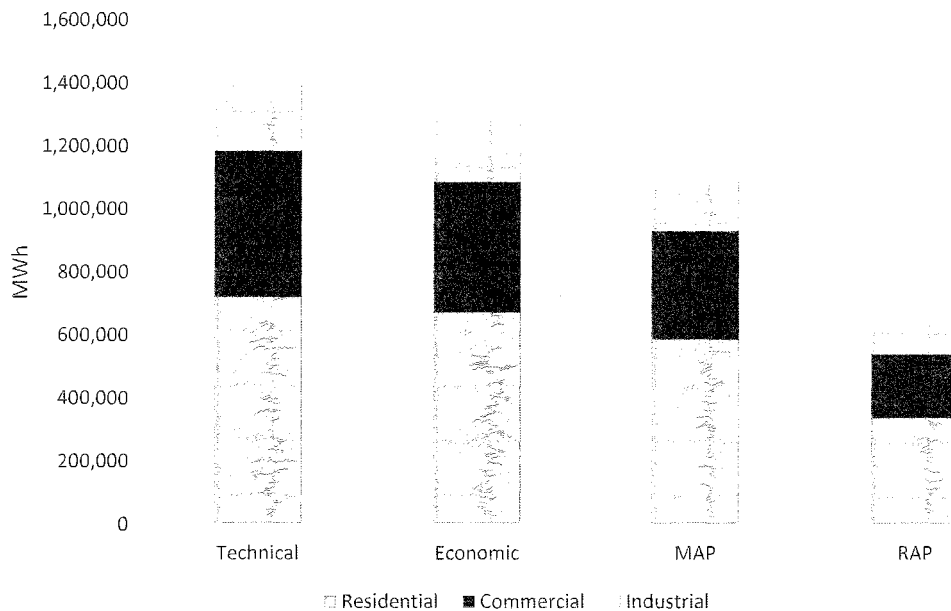
residential sector low-income component.¹ Approximately 65% of the residential sector budget addresses the low-income market segment, with about 27% of the RAP savings are attributable to this segment.

TABLE ES-1 INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY (NET OF LARGE CUSTOMER OPT-OUT LOAD)

	2020	2021	2022	2023	2024	2025
MWh						
Technical	179,992	209,578	199,765	194,021	182,130	169,589
Economic	167,372	192,143	183,629	179,315	168,500	156,910
MAP	91,970	135,273	134,335	135,296	133,380	126,777
RAP	57,005	69,699	66,105	67,277	68,583	67,330
Program	47,451	49,716	44,565	45,375	43,309	43,244
Forecasted Sales ²	3,340,248	3,345,466	3,360,838	3,378,011	3,402,115	3,414,693
Energy Savings (as % of Forecast)						
Technical	5.4%	6.3%	5.9%	5.7%	5.4%	5.0%
Economic	5.0%	5.7%	5.5%	5.3%	5.0%	4.6%
MAP	2.8%	4.0%	4.0%	4.0%	3.9%	3.7%
RAP	1.7%	2.1%	2.0%	2.0%	2.0%	2.0%
Program	1.4%	1.5%	1.3%	1.3%	1.3%	1.3%

Figure ES-1 provides the electric technical, economic, and achievable potential, by sector, by the end of the 20-year timeframe for the study (2020-2039). The residential sector contributes about half of the overall realistic achievable potential. Program potential only extends through 2025 and is not included in the figure below.

FIGURE ES-1 TWENTY (20)-YEAR CUMULATIVE ANNUAL ELECTRIC ENERGY EFFICIENCY POTENTIAL – ALL SECTORS COMBINED (NET OF LARGE CUSTOMER OPT-OUT LOAD)



¹ Low income households were characterized as homes that have household incomes at or below 200% of federal poverty guidelines. Based on data from the American Community 5-Year Public Use Microdata Set (PUMS), GDS used household income and number of people per household to identify the percent of the population at or below 200% of federal poverty guidelines for the Vectren South service area. 21% of single-family households and 48% of multifamily households were identified to meet the criteria.

² The forecasted sales here exclude opt-out customers. See Tables 1-2 through 1-5 for a comparison of the results with and without opt-out customers included in the analysis. Unless otherwise noted, the results in the report exclude opt-out sales and opt-out savings potential.

Measure-Level Realistic Achievable Potential (Net of Opt-Outs)

Table ES-2 provides the incremental RAP for each year by sector. The incremental annual savings potential ranges from 57 GWh to nearly 70 GWh. These results exclude load and savings attributed to large customers that have opted out of energy efficiency programs.

TABLE ES-2 INCREMENTAL ELECTRIC MEASURE LEVEL REALISTIC ACHIEVABLE POTENTIAL – BY SECTOR (2020-2025)

Incremental Annual (kWh)	2020	2021	2022	2023	2024	2025
Sector						
Residential	41,177	50,889	44,349	42,814	42,014	38,952
Commercial	10,311	12,122	13,911	15,609	16,770	17,811
Industrial	5,517	6,688	7,846	8,854	9,799	10,567
Total	57,005	69,699	66,105	67,277	68,583	67,330
Forecasted Sales (Net of Opt-Outs)	3,340,248	3,345,466	3,360,838	3,378,011	3,402,115	3,414,693
Incremental Annual Savings %						
Sector						
Residential	2.9%	3.5%	3.1%	2.9%	2.9%	2.6%
Commercial	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%
Industrial	0.9%	1.0%	1.2%	1.4%	1.5%	1.6%
% of Forecasted Sales	1.7%	2.1%	2.0%	2.0%	2.0%	2.0%

Table ES-3 provides the cumulative RAP for each year across the 2020-2025 timeframe. The cumulative annual savings potential ranges from 57 GWh to nearly 309 GWh. These results assume that opt-out industrial customers do not provide any savings potential.

TABLE ES-3 CUMULATIVE ELECTRIC MEASURE LEVEL REALISTIC ACHIEVABLE POTENTIAL – BY SECTOR (2020-2025)

Cumulative Annual (kWh)	2020	2021	2022	2023	2024	2025
Sector						
Residential	41,177	84,538	105,533	134,072	159,025	184,648
Commercial	10,311	21,974	35,168	49,609	64,869	80,454
Industrial	5,517	11,982	19,336	27,377	35,449	43,566
Total	57,005	118,494	160,037	211,059	259,344	308,667
Forecasted Sales (Net of Opt-Outs)	3,340,248	3,345,466	3,360,838	3,378,011	3,402,115	3,414,693
Cumulative Annual Savings %						
Sector						
Residential	2.9%	5.9%	7.3%	9.2%	10.8%	12.5%
Commercial	0.8%	1.8%	2.8%	4.0%	5.1%	6.3%
Industrial	0.9%	1.9%	3.0%	4.2%	5.5%	6.7%
% of Forecasted Sales	1.7%	3.5%	4.8%	6.2%	7.6%	9.0%

Table ES-4 provides the annual budgets in the RAP scenario. The total RAP budgets across all sectors ranges from \$24 million to \$35 million during the 2020-2025 timeframe.

TABLE ES-4 ANNUAL BUDGETS (2020-2025) IN THE RAP SCENARIO (\$ IN MILLIONS)

RAP Budgets	2020	2021	2022	2023	2024	2025
Energy Efficiency						
Incentives	\$16.2	\$21.1	\$22.8	\$24.0	\$24.8	\$24.6
Admin	\$4.8	\$6.2	\$6.4	\$6.6	\$7.0	\$7.0
Energy Efficiency Sub-Total	\$21.0	\$27.3	\$29.2	\$30.6	\$31.8	\$31.6
Demand Response / CVR						
Incentives	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Admin	\$1.4	\$1.7	\$2.1	\$1.6	\$1.0	\$0.9
Demand Response / CVR Sub-Total	\$1.4	\$1.7	\$2.1	\$1.6	\$1.0	\$0.9
Indirect ³	\$1.4	\$1.8	\$1.7	\$1.9	\$2.0	\$2.1
Total						
Total Costs	\$23.8	\$30.8	\$33.0	\$34.0	\$34.8	\$34.5

Measure-Level Realistic Achievable Potential (Including Opt-Outs)

Table ES-5 provides the incremental RAP for each year across the 2020-2025 timeframe, with sales and savings estimates from opt-out customers included. The incremental annual savings potential ranges from 72 GWh to 97 GWh. The incremental RAP increases by approximately 15 to 30 GWh across the timeframe, compared to the results with opt-out customers excluded.

TABLE ES-5 INCREMENTAL ELECTRIC REALISTIC ACHIEVABLE POTENTIAL – BY SECTOR (2020-2025)

Incremental Annual (GWh)	2020	2021	2022	2023	2024	2025
Sector						
Residential	41,177	50,889	44,349	42,814	42,014	38,952
Commercial	11,578	13,618	15,630	17,541	18,846	20,006
Industrial	19,324	23,576	27,883	31,695	35,218	38,149
Total	72,080	88,082	87,862	92,050	96,078	97,106
Forecasted Sales	5,163,888	5,174,499	5,196,938	5,221,660	5,253,393	5,273,051
Sector						
Residential	2.9%	3.5%	3.1%	2.9%	2.9%	2.6%
Commercial	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%
Industrial	0.8%	1.0%	1.2%	1.3%	1.5%	1.6%
% of Forecasted Sales	1.4%	1.7%	1.7%	1.8%	1.8%	1.8%

Table ES-6 provides the cumulative RAP for each year across the 2020-2025 timeframe, with sales and savings estimates from opt-out customers included. The cumulative annual savings potential ranges from 72 GWh to 426 GWh. The cumulative annual RAP increases by more than 100 GWh across the 2020-2025 timeframe, compared to the results with opt-out customers excluded.

³ Indirect costs represent costs that are not specifically attributed to individual programs and can include additional outreach, evaluation, and program planning activities.

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TABLE ES-6 CUMULATIVE ELECTRIC REALISTIC ACHIEVABLE POTENTIAL – BY SECTOR (2020-2025)

Cumulative Annual kWh	2020	2021	2022	2023	2024	2025
Sector						
Residential	41,177	84,538	105,533	134,072	159,025	184,648
Commercial	11,578	24,685	39,512	55,740	72,884	90,391
Industrial	19,324	41,785	67,208	94,837	123,025	151,326
Total	72,080	151,009	212,254	284,649	354,935	426,364
Forecasted Sales	5,163,888	5,174,499	5,196,938	5,221,660	5,253,393	5,273,051
Sector						
Residential	2.9%	5.9%	7.3%	9.2%	10.8%	12.5%
Commercial	0.8%	1.8%	2.8%	4.0%	5.1%	6.3%
Industrial	0.8%	1.8%	2.9%	4.0%	5.2%	6.4%
% of Forecasted Sales	1.4%	2.9%	4.1%	5.5%	6.8%	8.1%

DEMAND SAVINGS

The study also included an assessment of peak demand savings potential. Table ES-7 below provides the overall peak demand savings from energy efficiency, demand response, and CVR potential. The demand response potential assumes the energy efficiency peak demand reductions take precedent, and thereby reduce the baseline peak demand which can be further reduced by demand response.

TABLE ES-7 CUMULATIVE PEAK DEMAND SAVINGS POTENTIAL – MAP AND RAP (2020-2025)

MW	2020	2021	2022	2023	2024	2025
MAP						
Energy Efficiency	12	28	43	58	72	85
Demand Response	22	61	103	121	124	123
CVR	0.4	0.4	0.4	1.1	1.1	1.1
Total	34	90	147	180	197	209
RAP						
Energy Efficiency	8	16	23	31	38	45
Demand Response	7	19	37	47	51	51
CVR	0.4	0.4	0.4	1.1	1.1	1.1
Total	15	35	60	79	90	98

ACTION PLAN

The results of the potential study were leveraged to develop a DSM Action Plan for the 2020-2025 timeframe. The achievable potential identified by the potential study formed the basis of the development of program potential, which further accounts for budgetary and market considerations. Furthermore, the Vectren Electric DSM Action Plan was developed as an integrated effort with the Vectren Gas DSM Action Plan, in order to optimize program design, budget, and cost-effectiveness considerations. Table ES-8 provides the incremental program potential for each year across the 2020-2025 timeframe. The incremental annual savings potential ranges from 43,244 MWh to 49,716 MWh.

TABLE ES-8 INCREMENTAL ELECTRIC PROGRAM POTENTIAL – BY SECTOR (2020-2025)

Incremental Annual MWh	2020	2021	2022	2023	2024	2025
Sector						
Residential	22,880	24,682	18,353	17,461	16,186	16,349
Commercial and Industrial	24,571	25,034	26,212	27,914	27,124	26,895
Total	47,451	49,716	44,565	45,375	43,309	43,244
Forecasted Sales (Net of Opt-Outs)	3,340,248	3,345,466	3,360,838	3,378,011	3,402,115	3,414,693
Incremental Annual Savings %						
Sector						
Residential	1.6%	1.7%	1.3%	1.2%	1.1%	1.1%
Commercial and Industrial	1.3%	1.3%	1.4%	1.5%	1.4%	1.4%
Incremental Annual Savings %						
% of Forecasted Sales	1.4%	1.5%	1.3%	1.3%	1.3%	1.3%

Table ES-9 provides the cumulative Program Potential for each year across the 2020-2025 timeframe. The cumulative annual savings potential rises from 47,451 MWh to 273,660 MWh.

TABLE ES-9 CUMULATIVE ELECTRIC PROGRAM POTENTIAL – BY SECTOR (2020-2025)

Cumulative MWh	2020	2021	2022	2023	2024	2025
Sector						
Residential	22,880	47,562	65,915	83,376	99,562	115,911
Commercial and Industrial	24,571	49,605	75,817	103,730	130,854	157,749
Total	47,451	97,167	141,732	187,107	230,416	273,660
Forecasted Sales (Net of Opt-Outs)	3,340,248	3,345,466	3,360,838	3,378,011	3,402,115	3,414,693
Cumulative Annual Savings %						
Sector						
Residential	1.6%	3.3%	4.5%	5.7%	6.8%	7.9%
Commercial and Industrial	1.3%	2.6%	4.0%	5.5%	6.8%	8.2%
% of Forecasted Sales	1.4%	2.9%	4.2%	5.5%	6.8%	8.0%

Table ES-10 provides the annual budgets in the DSM Action Plan. The portfolio-level budgets range from \$10.3 million to \$11.2 million during the 2020-2025 timeframe.

TABLE ES-10 DSM ACTION PLAN ANNUAL BUDGETS (2020-2025)

Annual Budget	2020	2021	2022	2023	2024	2025
Residential						
Incentives	\$1.3	\$1.4	\$1.3	\$1.1	\$1.2	\$1.2
Admin	\$0.4	\$0.4	\$0.4	\$0.4	\$0.4	\$0.4
Implementation	\$3.5	\$3.8	\$3.8	\$3.8	\$3.9	\$4.0
Residential Sub-total	\$5.2	\$5.5	\$5.4	\$5.3	\$5.5	\$5.6
Commercial and Industrial						
Incentives	\$2.4	\$2.5	\$2.5	\$2.4	\$2.4	\$2.3
Admin	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2
Implementation	\$1.3	\$1.4	\$1.4	\$1.5	\$1.6	\$1.6
Commercial and Industrial Sub-total	\$3.9	\$4.0	\$4.1	\$4.1	\$4.2	\$4.1
Non-Sector Specific Costs						
Indirect	\$0.5	\$0.5	\$0.5	\$0.5	\$0.6	\$0.6
Evaluation	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5
Other	\$0.2	\$0.5	\$0.2	\$0.2	\$0.5	\$0.2
Total						
DSM Portfolio Total	\$10.3	\$11.1	\$10.8	\$10.7	\$11.2	\$11.0

COST-EFFECTIVENESS

For planning purposes, each of the recommended programs must pass the Utility Cost Test (UCT) and the Total Resource Cost (TRC) tests, except for Income-Qualified Programs which do not need to meet cost-effectiveness tests in order to promote a greater social good. The cost-effectiveness results are reported for the UCT and the TRC tests. Each program is assessed separately to determine relative benefits and costs (in contrast to assessing each individual measure). The definitions for the four standard tests most commonly used in EE program design are described below.

- *Total Resource Cost test (TRC)*. The benefits in this test are the lifetime avoided energy costs and avoided capacity costs. The costs in this test are the incremental measure costs plus all administrative costs spent by the program administrator.
- *Utility Cost Test (UCT)*. The benefits in this test are the lifetime avoided energy costs and avoided capacity costs, the same as the TRC benefits. The costs in this test are the program administrator's incentive costs and administrative costs.
- *Participant Cost Test (PCT)*. The benefits in this test are the lifetime value of retail rate savings (which is another way of saying "lost utility revenues"). The costs in this test are those seen by the participant; in other words: the incremental measure costs minus the value of incentives paid out.
- *Rate Impact Measure test (RIM)*. The benefits of the RIM test are the same as the TRC benefits. The RIM costs are the same as the UCT, except for the addition of lost revenue. This test attempts to show the effects that EE programs will have on rates, which is almost always to raise them on a per unit basis. Thus, costs typically outweigh benefits from the point of view of this test, but the assumption is that absolute energy use decreases to a greater extent than per-unit rates are increased — resulting in lower average utility bills.

Table ES-11 provides the cost-benefit ratios for each of the major cost-effectiveness tests as well as the TRC Net Benefits by program and sector. Cost-benefit screening was performed using DSMore.

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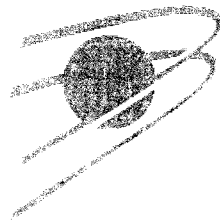
TABLE ES-11 VECTREN RECOMMENDED ACTION PLAN COST-EFFECTIVENESS SUMMARY

Program	TRC Ratio	TRC NET Benefits	UCR Ratio	PCT Ratio	RIM Ratio
Res Lighting	3.27	\$9,339,929	5.38	4.99	0.69
Res HEA	2.24	\$1,690,395	2.24		0.64
Res IQW	1.07	\$507,171	1.14	9.65	0.66
Res Schools	4.79	\$2,469,620	4.79		0.71
Res Behavior	1.82	\$1,503,965	1.82		0.61
Res Appliance Recycling	2.50	\$1,700,461	2.07		0.63
Res CVR	2.38	\$1,909,353	2.38		0.78
Res Food Bank	8.29	\$1,535,163	8.29		0.70
Res HEMS	1.01	\$11,100	1.01		0.47
Direct Load Control	4.07	\$10,016,215	3.06		2.28
Res New Construction	1.14	\$91,580	1.98	1.28	0.75
Res Prescriptive	1.41	\$3,069,767	1.91	2.01	0.77
Res Portfolio ALL E	2.12	\$33,844,720	2.35	4.90	0.81
CI Prescriptive	3.06	\$49,412,426	6.22	2.97	0.92
CI Custom	3.11	\$20,261,839	6.46	3.45	0.77
CI Small Business	1.74	\$4,065,481	2.49	3.09	0.53
CI CVR	2.55	\$1,538,199	2.55		0.86
CI Portfolio ALL	2.88	\$75,277,946	5.43	3.13	0.82
Total Portfolio ALL	2.33	\$102,456,927	3.25	3.56	0.79

VOLUME I

2020-2025 Integrated Electric DSM Market Potential Study

prepared for



VECTREN
Live Smart

JANUARY 2019

1 Introduction

1.1 BACKGROUND & STUDY SCOPE

This Market Potential Study was conducted to support the development of a DSM Action Plan for Vectren. 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. Separate estimates of electric energy efficiency and demand response potential were developed. The effort was highly collaborative, as the GDS Team worked closely alongside Vectren, as well as the Vectren Oversight Board, to produce reliable estimates of future saving potential, using the best available information and best practices for developing market potential saving 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, customer awareness and willingness to participate 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:
 - *Minimum Achievable Potential* estimates achievable potential on paying incentives equal to 100% of measure incremental costs and aggressive adoption rates.
 - *Realistic Achievable Potential* estimates achievable potential with Vectren 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.
 - *Program Potential* refers to the efficiency potential possible given specific program funding levels and designs; in this study program potential is addressed by the DSM Action Plan, which further addresses issues such as market dynamics (net versus gross impacts), timeframe differences, proxy versus specific program delivery approaches, and budget realities.

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 and natural gas avoided costs
- Future known changes to codes and standards

- Vectren 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, there are often reasonable alternative assumptions which would yield slightly different results.

1.4 ORGANIZATION OF REPORT

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

Section 2 Methodology details the methodology used to develop the estimates of technical, economic, and achievable energy efficiency and demand response potential savings.

Section 3 Market Characterization provides an overview of the Vectren service areas and a brief discussion of the forecasted energy sales by sector.

Section 4 Residential Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the residential sector.

Section 5 Commercial Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the commercial sector.

Section 6 Industrial Energy Efficiency Potential provides a breakdown of the technical, economic, and achievable potential in the industrial sector.

Section 7 Demand Response Potential provides a breakdown of the technical, economic, and achievable potential demand response by program type.

Appendices for the DSM Market Potential are included in Volume III of this report. MPS appendices include a discussion of sources used for the analysis, detailed measure level assumptions by customer segment, nonresidential sector potential savings (including opt-out customers), and detailed demand response results.

Methodology

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

The development of the DSM Action Plan, and associated savings during the 2020-2025 timeframe, are discussed in Volume II of this report.

2.1 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. The measure data allowed for benefit-cost screening to assess economic potential, which was in turn used as the basis for achievable potential, which took into consideration incentives and estimates of annual adoption rates.

For the commercial and industrial 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. Disaggregated forecast data served as the foundation for the development of the energy efficiency potential estimates. The creation of the disaggregation involved two steps. First, GDS looked at actual customer groupings based on NAICS code and then calibrated our top down load allocation based these codes to determine whether the customer was captured in the load forecast. Second, GDS determined the appropriate industry for industrial customers and the building type for commercial customers.

2.2 MARKET CHARACTERIZATION

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

2.2.1 Forecast Disaggregation

In the residential sector, GDS calibrated its building energy modeling simulations with Vectren's sales forecasts.⁴ This process began with the construction of building energy models, using the BEopt™ (Building Energy Optimization)⁵ software, which were specified in accordance with the most currently available data describing the residential building stock in the Vectren South service area. Models were constructed for both single-family and multifamily homes, as well as various types of heating and cooling equipment and fuel types. Key characteristics defining these models include conditioned square footage, typical building envelope conditions such as insulation levels and representative appliance and HVAC efficiency levels. The simulations yielded estimated energy consumption for each building prototype, including estimates of each key end use. These end use estimates were then multiplied by the estimated proportion of customers that applied to each end use, to calculate an estimated service territory total consumption for each end use. For example, when completing this process for the Vectren South electric potential analysis, the simulated heat

⁴ Vectren's sales forecast in all sectors excludes the impact of future DSM savings. Excluding future DSM savings prevents under-estimating energy efficiency savings potential.

⁵BEopt can be used to analyze both new construction and existing home retrofits, as well as single-family detached and multi-family buildings, through evaluation of single building designs, parametric sweeps, and cost-based optimizations.

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pump electric heating consumption was multiplied by the proportion of homes that rely on heat pumps for their electric heating needs, to calculate the total heat pump electric heating load in the Vectren South service territory.

The simulation process required several iterations. GDS collaborated with Vectren to verify and modify certain assumptions about the market characteristics, such as the heating fuel and equipment types. GDS adjusted its assumptions about key market characteristics and revised its BEopt models to calibrate its building energy models to within 1% of forecasted sales in 2020.

In the commercial and industrial sectors, disaggregated forecast data provides the foundation for the development of energy efficiency potential estimates. GDS disaggregated the nonresidential sector for Vectren into building or industry types using Vectren's commercial and industrial customer database and 2017 monthly sales data. GDS supplemented the Vectren customer database with a third-party dataset (purchased from InfoUSA) that provided additional SIC/NAICS code data by business.⁶ This disaggregation involved two steps. First, the GDS team used rate codes to determine whether the customer was captured in either Vectren's commercial or industrial load forecast. Next, GDS determined the appropriate industry for industrial customers and the building type for commercial customers. We used the following information, either from Vectren's customer data or third-party dataset, to determine the appropriate building or industry type. Using these fields, GDS assigned customers Vectren's non-residential data sets to one of the commercial or industrial segments listed in Table 2-1.

TABLE 2-1 NON-RESIDENTIAL SEGMENTS

COMMERCIAL

- Education
- Food Sales
- Food Service
- Health Care
- Hospital
- Large Office
- Large Retail
- Lodging
- Mercantile
- Office
- Public Assembly
- Warehouse

INDUSTRIAL

- Chemicals
- Fabricated Metals
- Food and Agriculture
- Machinery
- Mining
- Nonmetallic Mineral
- Paper
- Plastics and Rubber
- Primary Metals
- Transportation Equipment
- Wood

GDS further disaggregated sales for each of the segments into end uses. For commercial segments, GDS primarily used Vectren's 2016 end-use forecast planning models supplemented with updated EIA 2012 Commercial Building Energy Consumption Survey (CBECS) data for the East South-Central Census region. This information was used to determine energy use intensities, expressed in kWh per square foot, for each end use within each segment.⁷ We then used data compiled from metering studies, Evaluation, Measurement and Verification (EM&V), and engineering algorithms to further disaggregate energy intensities into more granular end uses and technologies. For the industrial sector, the analysis relied on the EIA's Manufacturing Energy Consumption survey to disaggregate industry-specific estimates of consumption into end uses.⁸

⁶ The Vectren dataset classifies businesses by Standard Industrial Classification (SIC) code, a four-digit standardized code, that has largely been replaced by the North American Industry Classification System (NAICS) code. The GDS Team converted the Vectren SIC codes to NAICS codes, then mapped NAICS/SIC codes to building and industry types considered in this study.

⁷ U.S. Energy Information Agency. *Commercial Buildings Energy Consumption Survey (CBECS)*. May 20, 2016.

<https://www.eia.gov/consumption/commercial/>. Although the Vectren service area officially resides in the East-North Central Census region, Vectren's long-term load forecast uses the East-South Central Census region as a more accurate representation of the Vectren service area.

⁸ U.S. EIA. *Manufacturing Energy Consumption Survey (MECS) 2010*. March 2013.

<https://www.eia.gov/consumption/manufacturing/data/2010/>.

Table 2-2 lists the electric end-uses considered in the forecast disaggregation and subsequent potential assessment.

TABLE 2-2 ELECTRIC END USES

RESIDENTIAL	COMMERCIAL	INDUSTRIAL
<input checked="" type="checkbox"/> Behavioural	<input checked="" type="checkbox"/> Cooking	<input checked="" type="checkbox"/> Agriculture
<input checked="" type="checkbox"/> Clothes Washer/Dryer	<input checked="" type="checkbox"/> Cooling	<input checked="" type="checkbox"/> Computers & Office Equipment
<input checked="" type="checkbox"/> Dishwasher	<input checked="" type="checkbox"/> Lighting	<input checked="" type="checkbox"/> CHP
<input checked="" type="checkbox"/> Electronics	<input checked="" type="checkbox"/> Office Equipment	<input checked="" type="checkbox"/> Lighting
<input checked="" type="checkbox"/> Hot Water	<input checked="" type="checkbox"/> Refrigeration	<input checked="" type="checkbox"/> Machine Drive
<input checked="" type="checkbox"/> HVAC Equipment	<input checked="" type="checkbox"/> Space Heating	<input checked="" type="checkbox"/> Process Heating
<input checked="" type="checkbox"/> HVAC Shell	<input checked="" type="checkbox"/> Ventilation	<input checked="" type="checkbox"/> Process Cooling
<input checked="" type="checkbox"/> Lighting	<input checked="" type="checkbox"/> Water Heating	<input checked="" type="checkbox"/> Space Cooling
<input checked="" type="checkbox"/> Pool/Spa		<input checked="" type="checkbox"/> Space Heating
		<input checked="" type="checkbox"/> Ventilation
		<input checked="" type="checkbox"/> Water Heating

2.2.2 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 Vectren service area, approximately 67% of C&I customers are eligible to opt-out.

Of eligible customers, nearly 76% have chosen to opt-out. As a result, only 49% of total C&I sales have not presently opted out of funding Vectren's energy efficiency programs.⁹

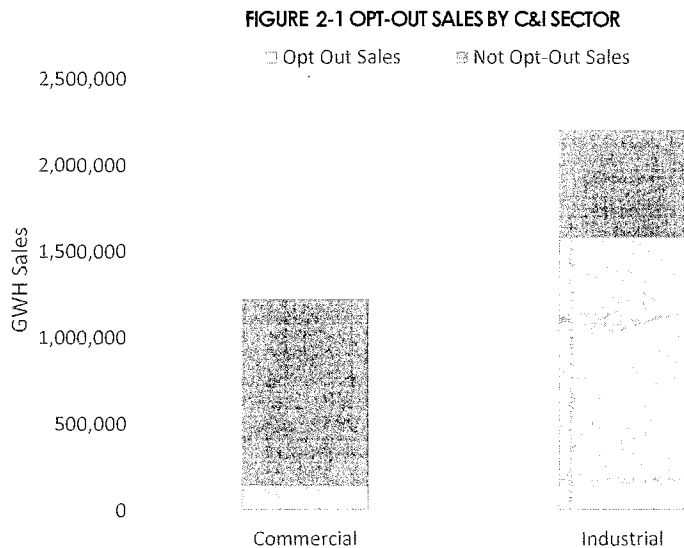


Figure 2-1 shows the total sales for the commercial and industrial sectors, as well as the sales, by sector, that have currently opted out of paying the charge levied to support utility-administered energy efficiency programs. The portion of sales that have not opted out include both ineligible

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 commercial and industrial sectors excluding sales from opt-out customers. Appendix E and Appendix F provide the respective results of commercial and industrial sector potential in a scenario that includes savings from Vectren's opt-out customers.

2.2.3 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.

⁹ These percentages were calculated based on the 2017 Vectren non-residential customer data and 2017 billing history.

2.2.3.1 Residential Sector

For the residential sector, GDS relied on several primary research efforts. The electric measure analysis was largely informed by a 2016 baseline survey of Vectren South customers. Nearly 500 responses to this survey provided a strong basis for many of the Vectren South electric measure baseline and efficient saturation estimates. A 2015 CFL and LED baseline study helped inform the saturation estimates for the lighting end use. A 2017 electric baseline thermostat survey of Vectren customers was leveraged to better characterize the increased prominence of smart and Wi-Fi-enabled thermostats.

EIA Residential Energy Consumption Survey (RECS) data from 2015 helped fill in data gaps that could not be directly informed by Vectren primary research. Other data sources included ENERGY STAR unit shipment data, Vectren evaluation reports, 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.

2.2.3.2 Commercial Sector

For the **commercial sector**, data collected through on-site visits as part of this study was leveraged to develop remaining factors for many of the measures. GDS coordinated with Vectren and the Oversight Board to develop a research plan, sampling plan, and a survey questionnaire used to collect data.

The study included primary onsite research with 38 of Vectren's commercial customers across all building types considered in the study.¹⁰ The on-site data collection included facility operation schedules and building characteristics, HVAC equipment type and efficiency levels, lighting fixture inventories, control systems and strategies, and related electric consuming equipment characteristics.

The survey data was used to inform two main assumptions for the potential study, the Base Case and the Remaining factors. The Base Case Factor is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. Survey data was used to determine fractional energy use for most measures in the study. The survey data provided counts for equipment and energy usage levels for the lighting, heating, cooling, water heating, motors and refrigeration end-uses. For example, T8 lighting used 88% of the energy for interior fluorescent lamps and fixtures for the surveyed buildings. The remaining usage was a combination of T12s, T5s and LED linear tube lighting. In total, 60% of the base case allocations came directly from the survey data and the other 40% came from regional potential study data from other Indiana Utilities or from GDS estimates based upon past study experience.

The remaining factor is the fraction of applicable kWh sales that are associated with equipment that has not yet been converted to the energy efficiency measure. It can also be defined as one minus the fraction of the market segment that already have the energy-efficiency measure installed, or one minus the market saturation for the measures. The commercial survey data was used to determine the remaining factors for 60% of all measures in the study. For example, the survey found that 24% of linear fluorescent lamps have already been converted to LEDs. The remaining factor for this measure is 76%. The latest ENERGY STAR shipment data report also provided remaining factors for several measures. The other remaining factors are either 100% for emerging technologies measures or estimates are based on GDS past study experience.

2.2.3.3 Industrial Sector

For the **industrial sector**, Vectren survey data was leveraged to determine the remaining factors for several end-uses, including motors, interior and exterior lighting and fixture measures. GDS was able to approximate the percentage of remaining standard efficiency motors from the survey data (approximately 67% appear to be standard efficiency), as well as the approximate percentage of remaining constant speed motors (non-VFD) for the industrial survey group (approximately 65% constant speed). GDS was also able to determine a percentage of remaining fluorescent tube

¹⁰ The full survey dataset was provided to Vectren as a deliverable.

fixture lighting and HID fixture lighting (non-LED) to be approximately 90% from the industrial survey responses. Other industrial process remaining factors were determined based on remaining factors used in previous studies, which were determined from baseline studies in other jurisdictions, the U.S. EIA 2013 Industrial Model Documentation Report, or GDS engineering estimates.

2.2.4 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 by definition, 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, whereas the remaining 50% of the market is not transformed and could backslide without the intervention of a Vectren program and an incentive. Similarly, for retrofit measures, we assumed that 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.

2.3 MEASURE CHARACTERIZATION

2.3.1 Measure List

The study's sector-level energy efficiency measure lists were informed by a range of sources including the Indiana TRM, current Vectren 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 Vectren and the 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 538 measure types for Vectren South – Electric. Some measures save both electric and natural gas. For those measures, the savings of both fuels were included in the benefit-cost screening.¹¹ 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 4,155 measure permutations for this study. Each permutation was screened for cost-effectiveness according to the Utility Cost Test (UCT). The parameters for cost-effectiveness under the UCT are discussed in detail later in Section 2.4.3.

¹¹ Because electric and natural gas results are presented in separate reports, costs were apportioned between electric and gas based on the relative amount of savings from each fuel type.

TABLE 2-3 NUMBER OF MEASURES EVALUATED

	# of Measures	Total # of Measure Permittances	# with UCT \$1
Vectren South – Electric			
Residential	185	636	449
Commercial	219	2,190	1,890
Industrial	165	1,464	1,424
Total	550	4,155	3,681

2.3.2 Emerging Technologies

GDS considered several specific emerging technologies as part of analyzing future potential. In the residential sector, these technologies include 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.

2.3.3 Assumptions and 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 Vectren when it was available and current. GDS used the most recent Vectren evaluation report findings (as well as Vectren program planning documents), 2015 Indiana Technical Reference Manual (IN TRM), the Illinois TRM, and the Michigan Energy Measures Database (MEMD) to a large amount of the data requirements. Evaluation report findings and the Indiana TRM were leveraged to the extent feasible – additional data sources were only used if these first two sources either did not address a certain measure or contained outdated information. The BEopt 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 Vectren 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), Energy Information Administration (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.¹² One exception is an assumed decrease in costs for light emitting diode (LED) bulbs over the study horizon. LED bulb consumer costs have been declining rapidly over the last several years and future cost projections indicate a continued decrease in bulb costs.¹³ GDS' treatment of LED bulb costs, LED lighting efficacy, and the impacts of the Energy Independence and Security Act ("EISA") are discussed in greater detail in Section 2.3.5, "Review of LED Lighting Assumptions."

GDS obtained measure cost estimates primarily from the Vectren 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 National Renewable Energy Lab (NREL)
- Program evaluation and market assessment reports completed for utilities in other states

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 Vectren 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 Appendices B-D.

2.3.4 Treatment of Codes and Standards

Although this analysis does not attempt to predict how energy codes and standards will change over time, the analysis does account for the impacts of several known improvements to federal codes and standards. Although not exhaustive, key adjustments include¹⁴:

- The baseline efficiency for air source heat pumps (ASHP) is anticipated to improve to 14 SEER/8.2 HSPF¹⁵ in 2015. As the existing stock of ASHPs was estimated to turn over and allowing for a sell-through period, the baseline efficiency was assumed to be the new federal standard, beginning in FY18.
- In 2015, the DOE makes amended standards effective for residential water heaters that required updated energy factors (EF) depending on the type of water heater and the rated storage volume. For electric storage water heaters with a volume greater than 55 gallons, the standards effectively require heat pumps for electric storage products. For storage tank water heaters with a volume of 55 gallons or less, the new standard (EF=0.948) becomes essentially the equivalent of today's efficient storage tank water heaters.¹⁶
- In March 2015, the DOE amended the standards for residential clothes washers. The new standards will require the Integrated Modified Energy Factor (MEF) (ft³/kWh/cycle) to meet certain thresholds based on the machine configurations. The ENERGY STAR specifications for residential clothes washers will also be amended to increase the efficiency of units that can earn the ENERGY STAR label. Version 7.0 of the ENERGY STAR specification is scheduled to go into effect in March 2015. These amended federal and ENERGY STAR standards have been factored into the study.

¹² GDS 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 Michigan Energy Measure Database (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.

¹³ LED Incremental Cost Study Overall Final Report. The Cadmus Group. February 2016

¹⁴ Key adjustments for LED screw-in lighting are addressed separately later in this section.

¹⁵ SEER: Seasonal Energy Efficiency Ratio; HSPF: Heating Seasonal Performance Factor.

¹⁶ Ultimately, GDS did not incorporate the requirements for large capacity water heaters into the analysis due to recent legislation that allows grid-enabled water heaters to remain at lower efficiency levels.

- In line with the phase-in of 2005 EPA Act regulations, the baseline efficiency for general service linear fluorescent lamps was moved from the T12 light bulb to a T8 light bulb effective June 1, 2016.
- New U.S. Department of Energy (DOE) standards require that all general service fluorescent lamps (GSFL) manufactured after Jan. 26, 2018, meet increased efficacy standards, or lumens per watt, to encourage the adoption of high-efficiency lighting products. In the T8 category, most lamps pass the standards. However, these are primarily reduced-wattage (e.g., 25W, 28W) lamps. The basic-grade 32W lamps do not comply. The standard provides a loophole which excludes fluorescent tubes with a color rendering index (CRI) of 87 or higher. Even with that loophole, there will be fewer T8 lamps to choose from going forward and it is likely that the move to linear LEDs will accelerate.

2.3.5 Review of LED Lighting Assumptions

Recognizing that there remains significant uncertainty regarding the future potential of residential screw-in lighting, GDS reviewed the latest lighting-specific program designs and consulted with industry peers to develop critical assumptions regarding the future assumed baselines for LED screw base omnidirectional, specialty/decorative, and reflector/directional lamps over the study timeframe.

EISA Impacts. LED screw base omnidirectional and decorative lamps are impacted by the EISA 2007 regulation backstop provision, which requires all non-exempt lamps to be 45 lumens/watt, beginning in 2020. Based on this current legislation, the federal baseline in 2020 will be roughly equivalent to a CFL bulb. However, in January 2017, the Department of Energy expanded the scope of the standard to include directional and specialty bulb but stated that they may delay enforcement based on ongoing dialog with industry stakeholders. Although there is uncertainty surrounding EISA and the backstop provision, the Market Potential Study assumes the backstop provision for standard (A-lamp) screw-in bulbs will take effect beginning in 2022. The analysis assumes the expanded definition of general service lamps to include specialty and reflector sockets will impact those sockets beginning in 2023.

LED Bulb Costs. Based on EIA Technology Forecast Report, LED bulb costs were assumed to decrease over the analysis period. LED bulb costs ranged between \$3 (standard) and \$8.60 (reflector) in 2020, decreasing to \$2-\$3 by 2039. Incentives were modeled as a % of incremental cost, resulting in decreasing incentives over the analysis timeframe as well.

LED Lighting Efficiency. Using the same EIA Technical Forecast Report, LED efficacy was also assumed to improve over the analysis timeframe. By 2040, the LED wattage of a bulb equivalent to a 60W incandescent will improve from 8W (today's typical LED) down to 4W.

2.3.6 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) are considered in the DSM Action Plan component of this study.

2.4 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.

2.4.1 Types of Potential

Potential studies often distinguish between several types of energy efficiency potential: technical, economic, achievable, and program. 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.

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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 2-2 illustrates the types of energy efficiency potential considered in this analysis. Program potential, in the form of the DSM Action Plan, is discussed in Volume II of the report.

FIGURE 2-2 TYPE OF ENERGY EFFICIENCY POTENTIAL¹⁷

Not Technically Feasible		TECHNICAL POTENTIAL		
Not Technically Feasible	Not Cost-Effective	ECONOMIC POTENTIAL		
Not Technically Feasible	Not Cost-Effective	Market Barriers	MAXIMUM ACHIEVABLE POTENTIAL	
Not Technically Feasible	Not Cost-Effective	Market Barriers	Policy Incentives	REALISTIC ACHIEVABLE POTENTIAL

2.4.1 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 that it was not possible to install all retrofit measures all 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.

2.4.2.1 Competing Measures and 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 have 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

¹⁷ Reproduced from "Guide to Resource Planning with Energy Efficiency." November 2007. US Environmental Protection Agency (EPA). Figure 2-1.

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.

2.4.3 Economic Potential

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

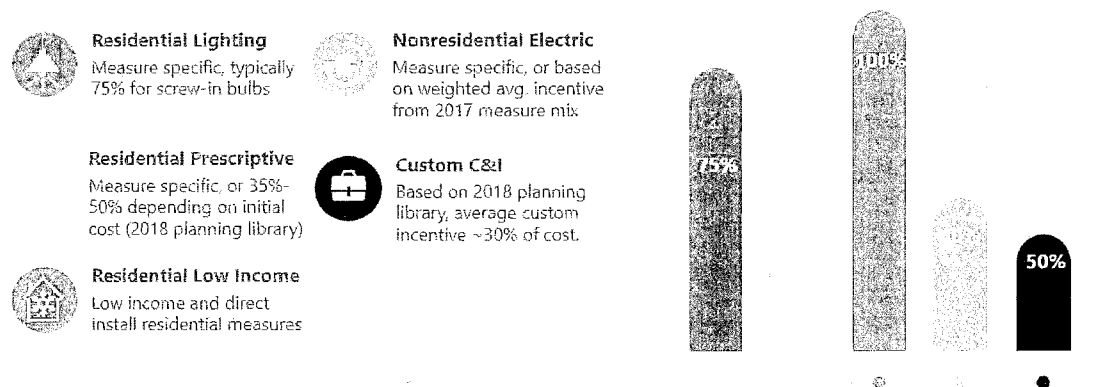
2.4.3.1 Utility Cost Test and Incentive Levels

The economic potential assessment included a screen for cost-effectiveness using the Utility Cost Test (UCT) at the measure level. In the Vectren South territory, the UCT considers both electric and natural gas savings as benefits, and utility incentives and direct install equipment expenses as the cost. 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.¹⁸

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.

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. Figure 2-3 describes the incentive levels by key market segment within the residential and nonresidential sectors.

FIGURE 2-3 INCENTIVES BY SECTOR AND MARKET SEGMENT



GDS relied on Vectren’s measure planning library and supporting DSM Operating Plan appendices to map current measure offerings to their historical incentive levels.¹⁹ For study measures that did not map directly to a current offering, GDS calculated the weighted average incentive level (based on 2017 participation) by sector and/or program and applied these “typical” incentive levels to the new measures.

¹⁸ 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 and the DSM Action Plan.

¹⁹ The measure planning library was leveraged primarily for determining current incentive levels rather than for developing estimates of future costs or savings potential.

- In the residential sector, lighting incentive levels were assumed to represent 75% of the measure cost. Remaining residential incentive levels were either 50% of the incremental measure cost, or 35% of the measure cost (for more expensive measures).
- Low income and direct install measures received incentives equal to 100% of the measure cost
- In the non-residential sector, prescriptive incentives were 50% of the measure cost, and custom measures received incentives equal to 30% of the measure cost³
- In the MAP scenario, all incentives were set to 100% of the incremental measure cost.

2.4.3.2 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 transmission and distribution (T&D) were provided by Vectren as part of an initial data request. Electric energy is based on an annual system marginal cost. For years outside of the avoided cost forecast timeframe, future year avoided costs are escalated by the rate of inflation.

2.4.4 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, customer awareness and willingness to participate 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:

- *Minimum Achievable Potential* estimates achievable potential on paying incentives equal to 100% of measure incremental costs and aggressive adoption rates.
- *Realistic Achievable Potential* estimates achievable potential with Vectren 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.

2.4.4.1 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 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 Vectren-specific Willingness to Participate (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.

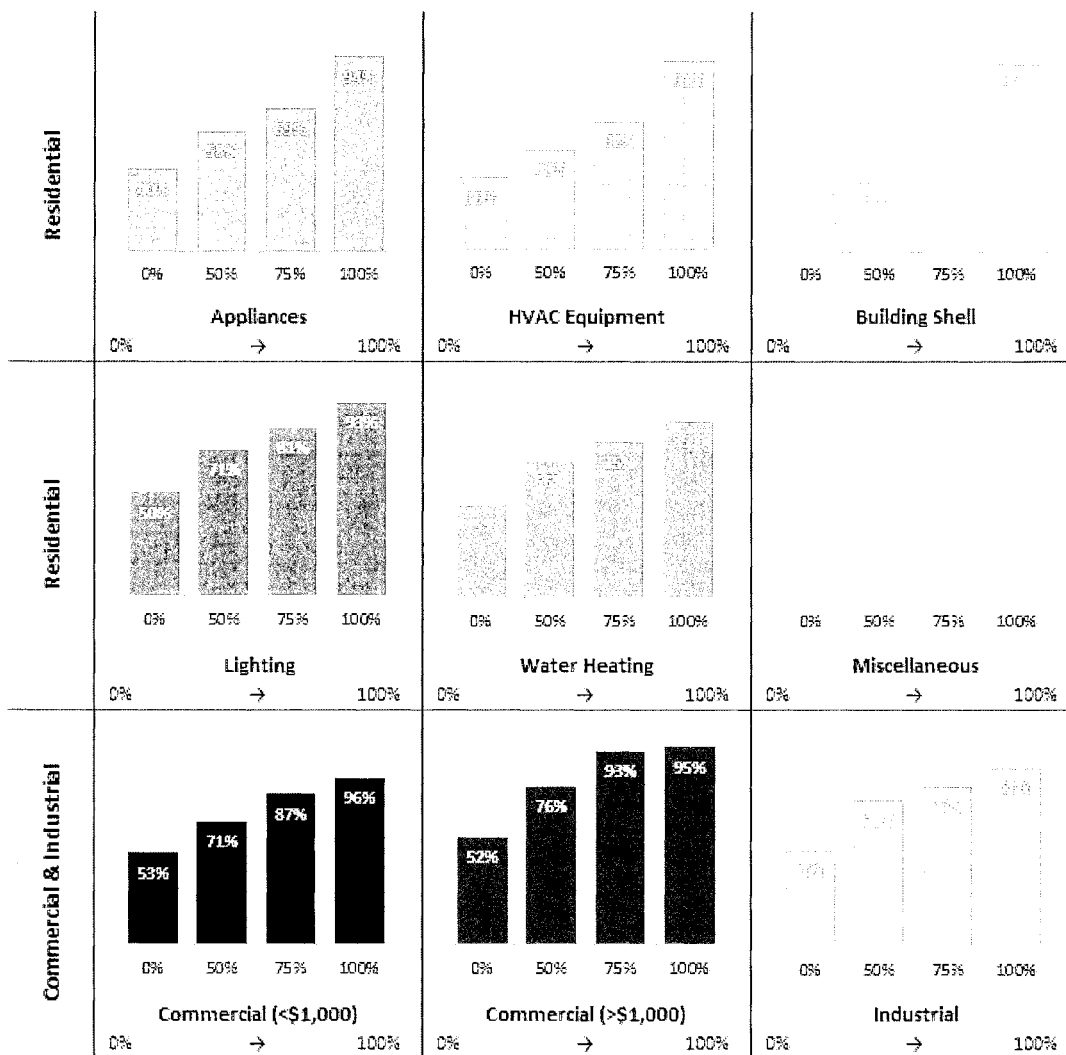
GDS utilized likelihood and willingness-to-participate data to estimate the long-term (20-year) market adoption potential for both the maximum and realistic achievable scenarios.²⁰ Table 2-4 presents the long-term market adoption rates at varied incentive levels used for both the residential and nonresidential sectors. When incentives are assumed to represent 100% of the measure cost (maximum achievable), the long-term market adoption ranged by sector and

²⁰ 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.

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end-use from 46% to 96%. For the RAP scenario, the incentive levels also varied by measure resulting in measure-specific market adoption rates.

TABLE 2-4 LONG-TERM MARKET ADOPTION RATES AT DISCRETE INCENTIVE LEVELS
 (based on Willingness-to-Participate Survey Results)



GDS then estimated initial year adoption rates by reviewing the current saturation levels of efficient technologies and (if necessary) calibrating the estimates of 2020 annual potential to recent historical levels achieved by Vectren's current DSM portfolio. This calibration effort ensures that the forecasted achievable potential in 2020 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.

One caveat to this approach is that the ultimate long-term adoption rate 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. Other benefits, such as increased comfort or safety and reduced maintenance costs could also factor into a customer's decision to purchase and install energy efficiency measures. To acknowledge these impacts, GDS considered the participant spillover and non-participant spillover rates (identified in prior Vectren

evaluations) that demonstrate the impacts that efficiency program and their marketing/education components can have on increased technology adoption. GDS used these spillover rates to increase the long-term adoption rates (typically by 5%-7%) at each incentive level.

2.4.4.2 Non-Incentive Costs

Consistent with National Action Plan for Energy Efficiency (NAPEE) guidelines²¹, utility non-incentive costs were included in the overall assessment of cost-effectiveness at the realistic achievable potential scenario. 2020 direct measure/program non-incentive costs were calibrated to recent 2016-2018 historical levels and set at \$0.045 per first year kWh saved for residential lighting, \$0.01 per first year kWh saved for residential behavior, \$0.145 for the remaining residential measures, and \$0.07 per first year kWh saved in the non-residential sectors. Non-incentive costs were then escalated annually at the rate of inflation%.²²

In addition to non-incentive costs attributed directly to programs and measures, the analysis also included indirect program delivery that are not specifically attributed to individual programs and can include additional outreach, evaluation, and program planning activities. These costs were calibrated to 2015-2018 historical levels of \$0.024 per first year kWh, escalated 5% annually.²³

2.5 DEMAND RESPONSE AND CVR POTENTIAL

This section provides an overview of the demand response and conservation voltage reduction (“CVR”) potential methodology. Summary results of the demand response analysis are provided in Section 7. Additional results details are provided in Appendix G.

2.5.1 Demand Response Program Options

Table 2-5 provides a brief description of the demand response (DR) program options considered and identifies the eligible customer segment for each demand response program that was considered in this study. This includes direct load control (DLC) and rate design options.

TABLE 2-5 DEMAND RESPONSE PROGRAM OPTIONS AND ELIGIBLE MARKETS

DR Program Option	Program Description	Eligible Markets
DLC AC (Switch)	The compressor of the air conditioner is remotely shut off (cycled) by the system operator for periods that may range from 7 ½ to 15 minutes during every 30-minute period (i.e., 25%-50% duty cycle)	Residential and Non-Residential Customers
DLC AC (Thermostat)	The system operator can remotely raise the AC’s thermostat set point during peak load conditions, lowering AC load.	Residential and Non-Residential Customers

²¹ 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.

²² As noted earlier in the report, measure costs and utility incentives were not escalated over the 20-year analysis timeframe to keep those costs constant in nominal dollars.

²³ The historic compound average annual growth rate (CAGR) over the same time is 22.6%. GDS used a more conservative escalation rate based on an expected slower growth rate in the future.

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DR Program Option	Program Description	Eligible Markets
DLC Pool Pumps	The swimming pool pump is remotely shut off by the system operator for periods normally ranging from 2 to 4 hours.	Residential Customers
DLC Water Heaters	The water heater is remotely shut off by the system operator for periods normally ranging from 2 to 8 hours.	Residential and Non-Residential Customers
Critical Peak Pricing with Enabling Technology	A retail rate in which an extra-high price for electricity is provided during a limited number of critical periods (e.g. 100 hours) of the year. Market-based prices are typically provided on a day-ahead basis, or an hour-ahead basis. Includes enabling technology that connects technologies within building. Only for customers with AC.	Residential and Non-Residential Customers
Critical Peak Pricing without Enabling Technology	A retail rate in which an extra-high price for electricity is provided during a limited number of critical periods (e.g. 100 hours) of the year. Market-based prices are typically provided on a day-ahead basis, or an hour-ahead basis.	Residential and Non-Residential Customers
Real Time Pricing	A retail rate in which customers pay electricity supply rates that vary by the hour.	Non-Residential Customers
Peak Time Rebates	A program where customers are rewarded if they reduce electricity consumption during peak times with monetary rebates.	Residential and Non-Residential Customers
Time of Use Rates	A retail rate in which customers are charged higher rates for the energy they use during specific peak demand times.	Residential and Non-Residential Customers

Double-counting savings from demand response programs that affect the same end uses is a common issue that must be addressed when calculating the demand response savings potential. For example, a direct load control (DLC) program of air conditioning and a rate program both assume load reduction of the customers' air conditioners. For this reason, it is typically assumed that customers cannot participate in programs that affect the same end uses. As Vectren has offered a DLC program for many years, it was assumed that participation in this offering be prioritized before rate-based DR options. The order of the rest of the programs is based on savings where programs with higher savings per customer are prioritized.

2.5.2 Demand Response Potential Assessment Approach Overview

The analysis of DR, where possible, closely followed the approach outlined for energy efficiency. The framework for assessing the cost-effectiveness of demand response programs is based on *A Framework for Evaluating the Cost-Effectiveness of Demand Response, prepared for the National Forum on the National Action Plan (NAPA) on Demand Response*.²⁴ Additionally, GDS reviewed the May 2017 National Standard Practice Manual published by the National Efficiency Screening Project.²⁵ GDS utilized this guide to define avoided ancillary services and energy and/or capacity price suppression benefits.

The demand response analysis was conducted using the GDS Demand Response Model. The Model determines the estimated savings for each demand response program by performing a review of all benefits and cost associated with each program. GDS developed the model such that the value of future programs could be determined and to help facilitate demand response program planning strategies. The model contains approximately 50 required inputs for each program including: expected life, coincident peak ("CP") kW load reductions, proposed rebate levels, program related expenses such as vendor service fees, marketing and evaluation cost and on-going O&M expenses. This model and future program planning features can be used to standardize the cost-effectiveness screening process between Vectren departments interested in the deployment of demand response resources.

The UCT was used to determine the cost-effectiveness of each demand response program. Benefits are based on avoided demand, energy (including load shifting), wholesale cost reductions and T&D costs. Costs include incremental program equipment costs (such as control switches or smart thermostats), fixed program capital costs (such as the cost of a central controller), program administrative, marketing, and evaluation costs. Incremental equipment program costs are included for both new and replacement units (such as control switches) to account for units that are replaced at the end of their useful life.

The demand response analysis includes estimates of technical, economic, and achievable potential. Achievable potential is broken into maximum and RAP in this study:

MAP represents an estimate of the maximum cost-effective demand response potential that can be achieved over the 15-year study period. For this study, this is defined as customer participation in demand response program options that reflect a "best practices" estimate of what could eventually be achieved. MAP assumes no barriers to effective delivery of programs.

RAP represents an estimate of the amount of demand response potential that can be realistically achieved over the 20-year study period. For this study, this is defined as achieving customer participation in demand response program options that reflect a realistic estimate of what could eventually be achieved assuming typical or "average" industry experience. RAP is a discounted MAP, by considering program barriers that limit participation, therefore reducing savings that could be achieved.

Last, the analysis evaluated direct load control of thermostat potential under two possible conditions: 1) a **Bring Your Own Thermostat (BYOT) scenario** where the customer provides their own thermostat and are monetarily incentivized; and 2) a **utility incentivized scenario** where the utility provides the smart thermostat and provides a smaller monetary incentive. These options are described in more detail in Appendix G.

2.5.3 Avoided Costs

Demand response avoided costs were consistent with those utilized in the energy efficiency potential analysis and were provided by Vectren. The primary benefit of demand responses is avoided generation capacity, resulting from a

²⁴ Study was prepared by Synapse Energy Economics and the Regulatory Assistance Project, February 2013.

²⁵ National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources, May 18, 2017, Prepared by The National Efficiency Screening Project

reduction in the need for new peaking generation capacity. Demand response can also produce energy related benefits. If the demand response option is considered “load shifting”, such as direct load control of electric water heating, the consumption of energy is shifted from the control period to the period immediately following the period of control. For this study, GDS assumed that the energy is shifted with no loss of energy. If the program is not considered to be “load shifting” the measure is turned off during peak control hours, and the energy is saved altogether. Demand response programs can also potentially delay the construction of new transmission and distribution lines and facilities, which is reflected in avoided T&D costs.

2.5.4 Demand Response Program Assumptions

This section briefly discusses the general assumptions and sources used to complete the demand response potential analysis. Appendix G provides additional detail by program and sector related to load reduction, program costs, and projected participation.

Load Reduction: Demand reductions were based on load reductions found in Vectren’s existing demand response programs, and various secondary data sources including the FERC and other industry reports, including demand response potential studies. DLC and thermostat-based DR options were typically calculated based on a per-unit kW demand reduction whereas rate-based DR options were typically assumed to reduce a percentage of the total facility peak load.

Useful Life: The useful life of a smart thermostat is assumed to be 15 years . Load control switches have a useful life of 15 years. This life was used for all direct load control measures in this study.

Program Costs: One-time program development costs included in the first year of the analysis for new programs. No program development costs are assumed for programs that already exist. Each new program includes an evaluation cost, with evaluation cost for existing programs already being included in the administration costs. It was assumed that there would be a cost of \$50²⁶ per new participant for marketing for the DLC programs. Marketing costs are assumed to be 33.3% higher for MAP. All program costs were escalated each year by the general rate of inflation assumed for this study.

Substitution: The number of control units per participant was assumed to be 1 for all direct load control programs using switches (such as water heaters and air conditioning switches), because load control switches can control up to two units. However, for controllable thermostats, some participants have more than one thermostat. The average number of residential thermostats per single family home was assumed to be 1.72 thermostats.

2.5.5 DR Program Adoption Levels

Long-term program adoption levels (or “steady state” participation) represent the enrollment rate once the fully achievable participation has been reached. GDS reviewed industry data and program adoption levels from several utility DR programs. The main sources of participant rates are several studies completed by the Brattle Group. Additional detail about participation rates and sources are shown in Appendix G. As noted earlier in this section, for direct load control programs, MAP participation rates rely on industry best adoption rates and RAP participation rates are based on industry average adoption levels. For the rate programs, the MAP steady-state participation rates assumed programs were opt-out based and RAP participation assumed opt-in status.

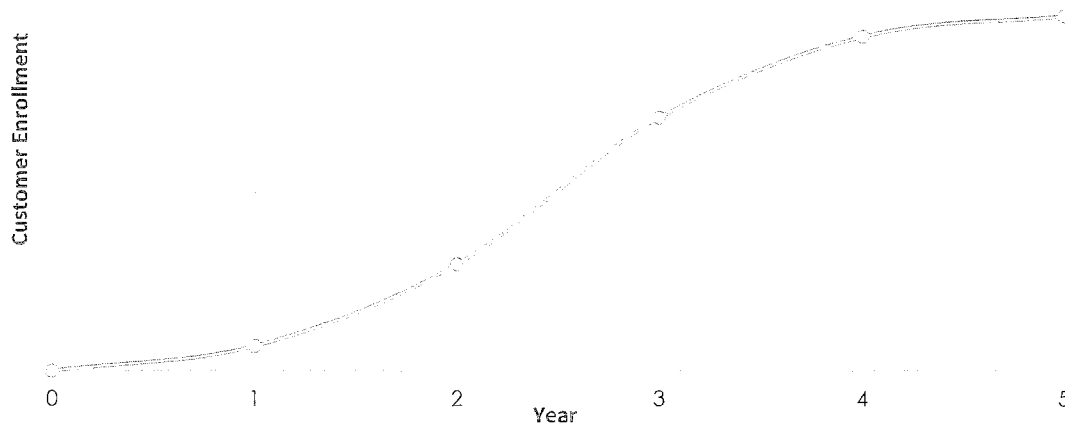
Customer participation in new demand response programs is assumed to reach the steady state take rate over a five-year period. The path to steady state customer participation follows an “S-shaped” curve, in which participation growth accelerates over the first half of the five-year period, and then slows over the second half of the period (see Figure 2-

²⁶ TVA Potential Study Volume III: Demand Response Potential, Global Energy Partners, December 2011

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4). Existing programs have already gone through this ramp-up period, so they were escalated linearly to the final participation rate.

FIGURE 2-4 ILLUSTRATION OF S-SHAPED MARKET ADOPTION CURVE



2.5.8 Conservation Voltage Reduction (CVR)

GDS evaluated CVR as a demand response program capable of providing avoided energy and demand cost benefits through reduction of voltages along circuits fed by two different substations. CVR has been demonstrated by Vectren in an existing application at the Buckwood substation. Vectren plans to expand its CVR program to the East Side substation in 2020 and the Broadview substation in 2023. GDS has modeled the potential of CVR as reflecting the East Side and Broadview implementations only.

Energy and demand impacts were estimated by GDS using a combination of data sources, including the EM&V analysis of the Buckwood pilot program, an engineering report prepared by Power Systems Engineering, and data summarizing the customer counts by sector and energy sales volumes for each of the three substations. When CVR is implemented, energy savings are achieved for the hours of reduction, and Vectren indicated they intend to continue to operate CVR for a number of hours throughout the year, leading to energy savings and demand savings for the expanded program. The East Side substation is projected to save 2.63% of its residential and 4.71% of its C&I annual energy sales through application of CVR. Analysis by Power Systems Engineering indicates that the Broadview substation would achieve greater potential energy savings relative to East Side, achieving a 3.25% reduction of residential energy sales and 4.86% of C&I energy sales. Table 2-6 shows these impact details.

TABLE 2-6 CVR IMPACTS BY SUBSTATION

Substation	East Side	Broadview
Residential		
Total Energy Sales (kWh)	55,586,807	53,397,685
% Savings Assumed from CVR	2.63%	3.25%
CVR Energy Savings (kWh)	1,461,047	1,733,455
CVR Demand Savings (kW)	263	312
Commercial & Industrial		
Total Energy Sales (kWh)	21,922,082	43,766,990
% Savings Assumed from CVR	4.71%	4.86%
CVR Energy Savings (kWh)	1,032,655	2,127,540
CVR Demand Savings (kW)	186	383

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Substation	Est. Size	Bracoview
Substation Total		
Total Energy Sales (kWh)	77,508,888	97,164,675
% Savings Assumed from CVR	3.22%	3.97%
CVR Energy Savings (kWh)	2,493,702	3,860,995
CVR Demand Savings (kW)	449	695

Two sources of program costs are included in the cost effectiveness screening for CVR: implementation costs and administrative costs. Incentives are not necessary as voltage reduction is achieved without requiring participation or consent from customers and without sacrificing quality of service. Implementation costs are annualized based on a carrying cost factor that includes 30-years of straight-line depreciation, 4.0% interest for debt, and 3.2% for O&M.

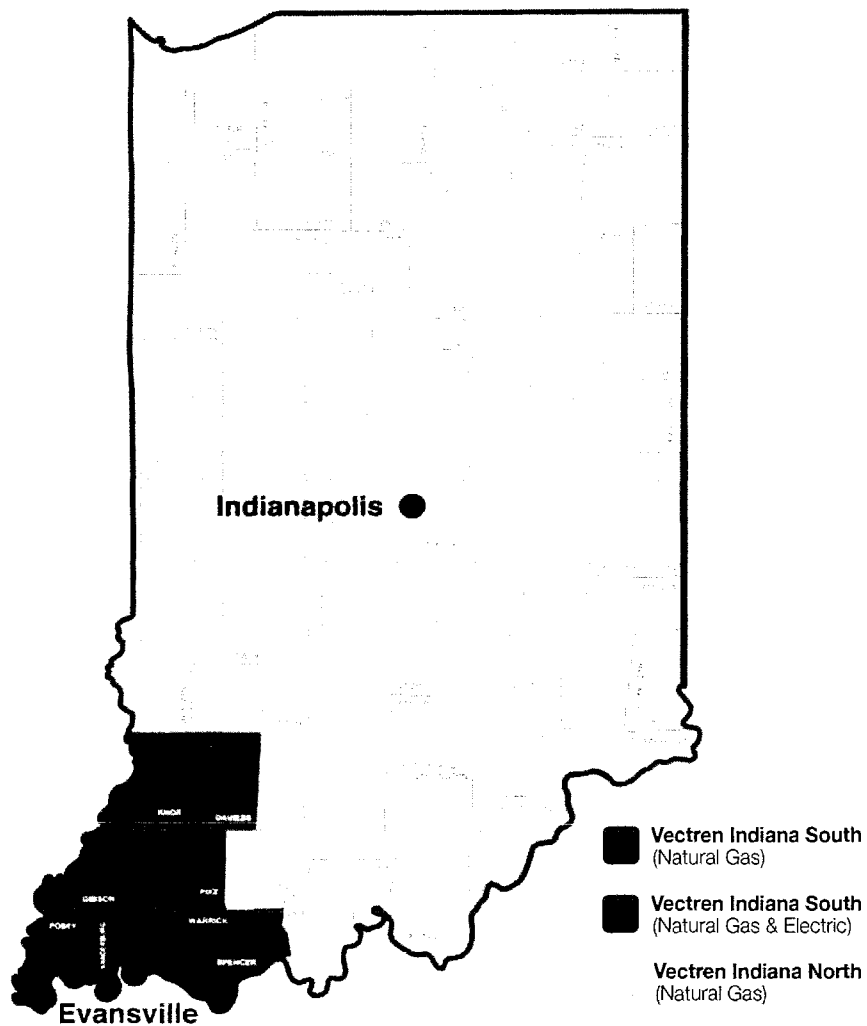
3 Market Characterization

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 Vectren's electric 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 VECTREN INDIANA SERVICE AREAS

This study assessed the electric energy efficiency potential for Vectren South. Figure 3-1 provides the overall Vectren South and Vectren North territories in Indiana.

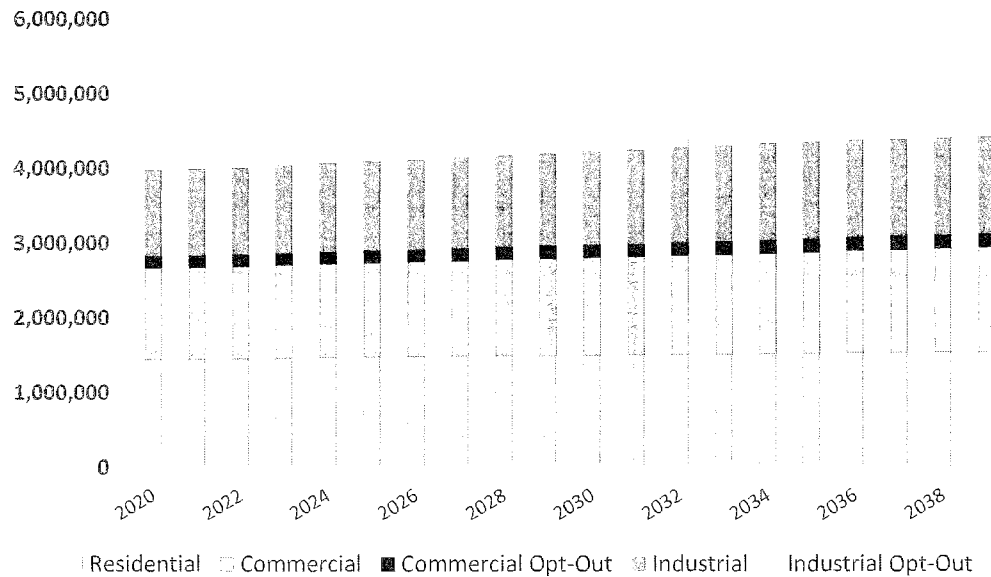
FIGURE 3-1 VECTREN SERVICE TERRITORY MAP



3.2 LOAD FORECASTS

Figure 3-2 provides the electric sales by sector across the 2020-2039 timeframe. Sales are forecasted to gradually increase from 5.2 million MWh to 5.6 million MWh from 2020 to 2039. The sales figure shows commercial and industrial sales break outs of the sales projections for opt-out customers.

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

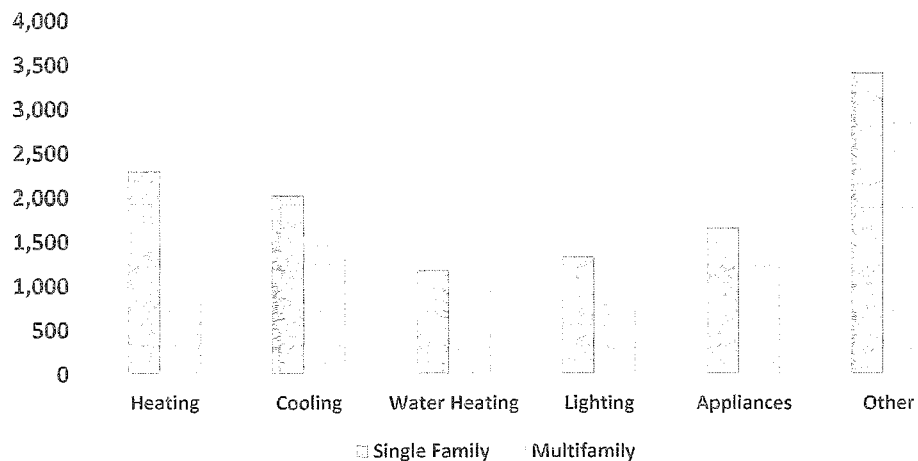


3.3 SECTOR LOAD DETAIL

3.3.1 Residential Sector

The residential electric calibration effort led to a housing-type specific end-use intensity breakdown as shown below in Figure 3-3. Overall, we estimated single-family consumption to be just shy of 12,000 kWh per year, and multifamily homes to be about 8,200 kWh per year. The "Other" end use is the leading end-use among both housing types. This reflects the increasing prominence of electronics and other plug in devices.

FIGURE 3-3 RESIDENTIAL ELECTRIC END-USE BREAKDOWN BY HOUSING TYPE



3.5.3 Commercial Sector

Figure 3-4 provides a breakdown of commercial electric sales by building type. Mercantile (25%) and Office (20%) are the leading contributors of stand-alone building types to the total commercial electric sales.²⁷

FIGURE 3-4 COMMERCIAL ELECTRIC SALES BREAKDOWN BY BUILDING TYPE

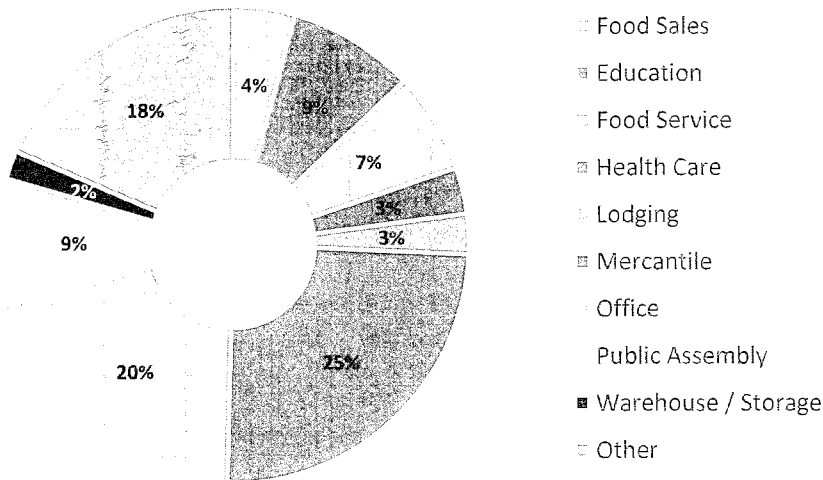
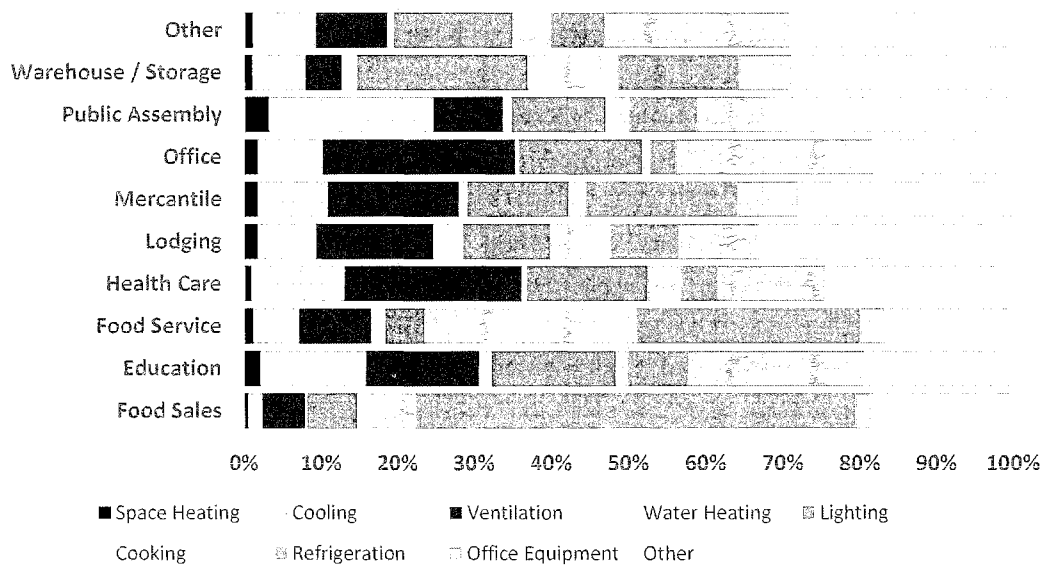


Figure 3-5 provides an illustration of the leading end-uses across all building types in the commercial sector. Ventilation, lighting, and refrigeration are prominent across most of the building types.

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



²⁷ "Other" building types include buildings that engage in several different activities, a majority of which are commercial (e.g. retail space), though the single largest activity may be industrial or agricultural; "other" also includes miscellaneous buildings that do not fit into any other category.

3.3.3 Industrial Sector

Figure 3-6 provides a breakdown of industrial electric sales by industry type. Food (20%) and Plastics & Rubber (15%) are the leading industry types contributing to industrial electric sales.

FIGURE 3-6 INDUSTRIAL ELECTRIC INDUSTRY TYPE BREAKDOWN²⁸

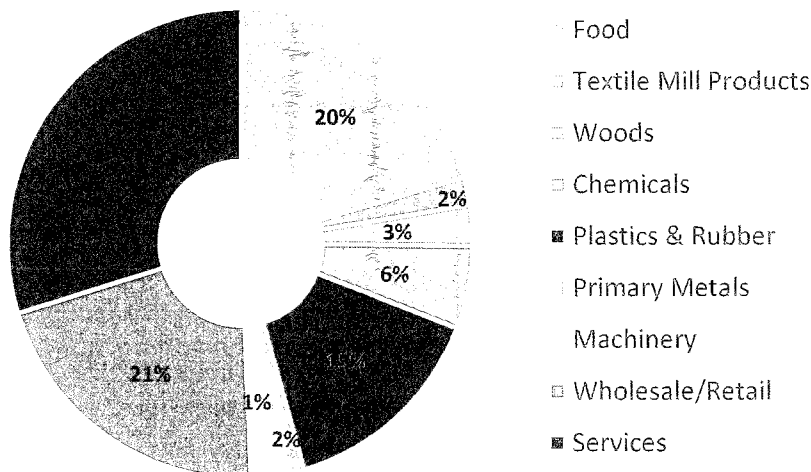
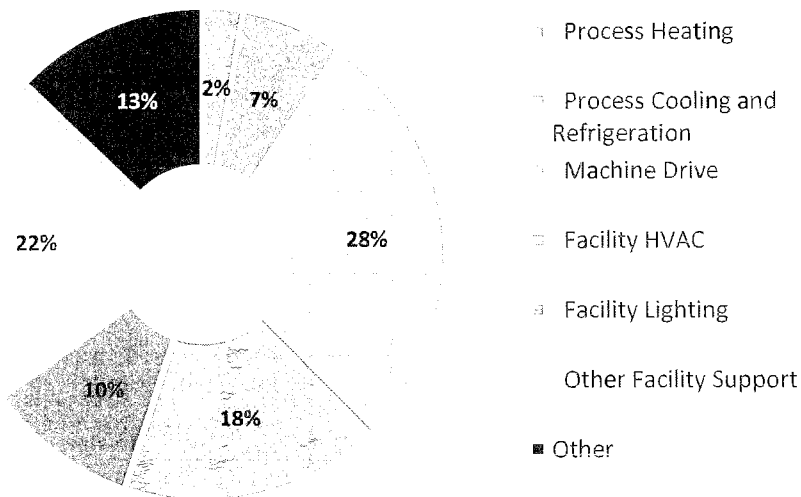


Figure 3-7 provides a breakdown of the industrial electric sales end use. Machine Drive (28%) and Facility HVAC (18%) are the leading end-uses.

FIGURE 3-7 INDUSTRIAL ELECTRIC END-USE BREAKDOWN



²⁸ "Wholesale/Retail" and "Services" industrial types include industrial buildings that devote a minority percentage of floor space to commercial activities like wholesale and retail trade, and construction, healthcare, education and accommodation & food service. Automotive related industries are divided between plastics, rubber, and machinery based on their NAICS codes.

4 Residential Energy Efficiency Potential

This section provides the potential results for technical, economic, MAP and RAP for the residential sector. Results are broken down by fuel type as well as end use. The cost-effectiveness results and budgets for the RAP scenario are also provided.

4.1 SCOPE OF MEASURES & END USES ANALYZED

There were 185 total unique electric measures included in the analysis. Table 4-1 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 Vectren 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.

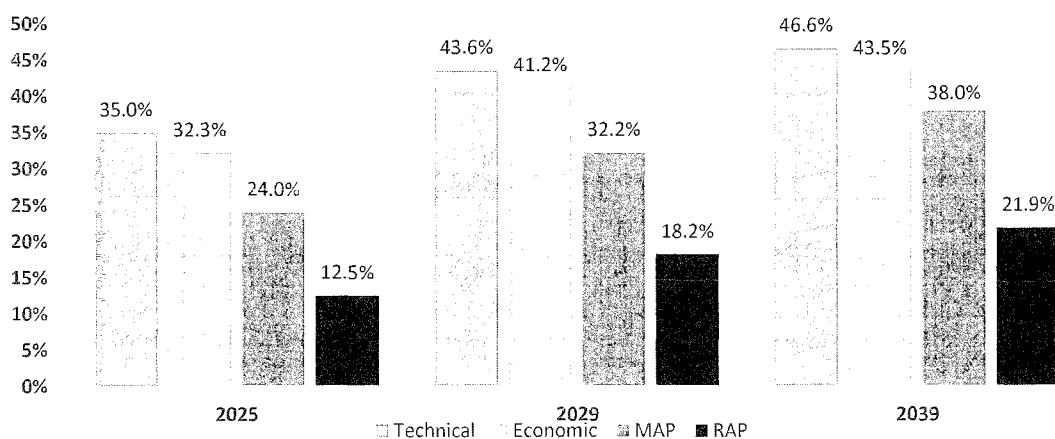
TABLE 4-1 RESIDENTIAL ENERGY EFFICIENCY MEASURES – BY END USE AND FUEL TYPE

End-Use	Number of Unique Measures
Appliances	26
Audit	6
Behavioral	9
HVAC Equipment	41
Lighting	15
Miscellaneous	6
New Construction	4
Plug Loads	9
HVAC Shell	55
Water Heating	14

4.2 RESIDENTIAL ELECTRIC POTENTIAL

Figure 4-1 provides the technical, economic, MAP and RAP results for the 6-year, 10-year, and 20-year timeframes. The 6-year technical potential is 35.0% of forecasted sales, and the economic potential is 32.3% of forecasted sales. The 6-year MAP is 24.0% and the RAP is 12.5%.

FIGURE 4-1 RESIDENTIAL ELECTRIC ENERGY CUMULATIVE ANNUAL POTENTIAL (AS A % OF RESIDENTIAL SALES)



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Table 4-2 provides cumulative annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The RAP increases to more than 12% cumulative annual savings over the next six years.

TABLE 4-2 RESIDENTIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	114,516	242,109	325,265	410,315	460,483	515,889
Economic	106,549	222,594	297,135	376,090	422,227	475,305
MAP	53,840	136,061	192,386	253,741	306,917	353,855
RAP	41,177	84,538	105,533	134,072	159,025	184,648
Forecasted Sales	1,443,774	1,444,794	1,451,508	1,458,672	1,469,169	1,473,649
Energy Savings (as % of Forecast)						
Technical	7.9%	16.8%	22.4%	28.1%	31.3%	35.0%
Economic	7.4%	15.4%	20.5%	25.8%	28.7%	32.3%
MAP	3.7%	9.4%	13.3%	17.4%	20.9%	24.0%
RAP	2.9%	5.9%	7.3%	9.2%	10.8%	12.5%

Table 4-3 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 2.6% to 3.5% per year over the next six years.

TABLE 4-3 RESIDENTIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	114,516	136,960	120,797	111,329	99,306	86,829
Economic	106,549	124,856	110,653	103,092	92,493	81,164
MAP	53,840	90,090	82,609	79,096	75,741	68,596
RAP	41,177	50,889	44,349	42,814	42,014	38,952
Forecasted Sales	1,443,774	1,444,794	1,451,508	1,458,672	1,469,169	1,473,649
Energy Savings (as % of Forecast)						
Technical	7.9%	9.5%	8.3%	7.6%	6.8%	5.9%
Economic	7.4%	8.6%	7.6%	7.1%	6.3%	5.5%
MAP	3.7%	6.2%	5.7%	5.4%	5.2%	4.7%
RAP	2.9%	3.5%	3.1%	2.9%	2.9%	2.6%

Technical & Economic Potential

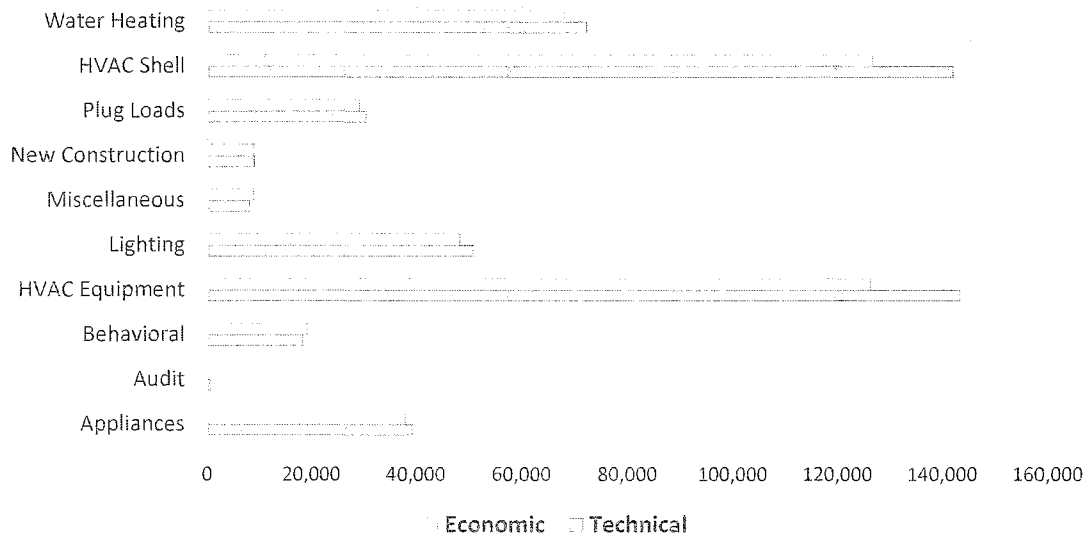
Table 4-4 provides cumulative annual technical and economic potential results from 2020-2025. Figure 4-2 shows a comparison of the technical and economic potential (6-year) by end use. The HVAC Shell and HVAC Equipment are by far the leading end-uses among technical and economic potential.

TABLE 4-4 TECHNICAL AND ECONOMIC RESIDENTIAL ELECTRIC POTENTIAL

	2020	2021	2022	2023	2024	2025
Energy (MWh)						
Technical	114,516	242,109	325,265	410,315	460,483	515,889
Economic	106,549	222,594	297,135	376,090	422,227	475,305
Peak Demand (MW)						
Technical	18.9	39.3	55.4	70.1	80.0	90.1
Economic	16.7	34.2	48.2	61.1	70.1	79.3

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FIGURE 4-2 6-YEAR TECHNICAL AND ECONOMIC RESIDENTIAL ELECTRIC POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 4-3 illustrates the cumulative annual MAP results by end use across the 2020-2025 timeframe. Like technical and economic potential, HVAC Shell and HVAC Equipment are the leading end uses. Water Heating, Lighting and Appliances also have significant maximum achievable potential.

FIGURE 4-3 RESIDENTIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) MAP POTENTIAL BY END-USE

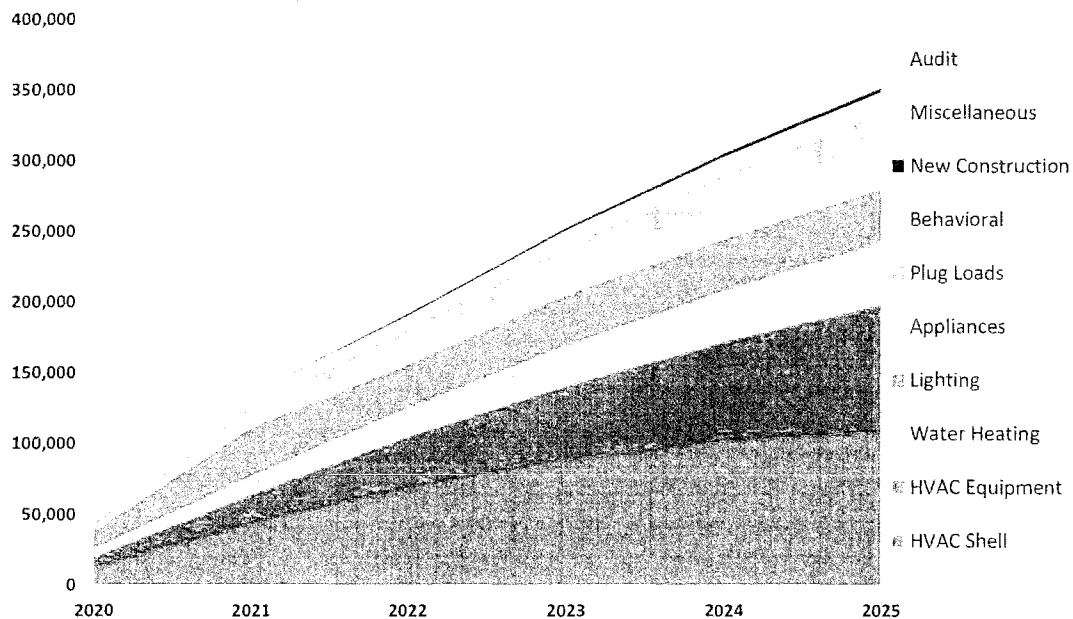


Table 4-5 provides the incremental and cumulative annual MAP across the 2020-2025 timeframe. The incremental MAP potential peaks in 2021 and declines slightly from 2022-2025 as the EISA backstop provision reduces lighting

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potential and the HVAC Shell end use declines after much of the retrofit measures have been exhausted quickly in the MAP scenario.

TABLE 4-5 RESIDENTIAL ELECTRIC MAP BY END-USE

End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Appliances	3,722	4,817	5,313	5,351	5,133	4,722
Audit	61	119	146	167	180	187
Behavioral ²⁹	9,042	8,056	8,175	8,344	8,597	9,884
HVAC Equipment	6,596	13,003	15,440	17,537	18,995	19,707
Lighting	13,134	21,487	13,717	11,990	10,085	6,389
Miscellaneous ³⁰	161	215	278	348	421	490
New Construction	255	345	473	587	677	849
Plug Loads	2,023	3,604	4,433	5,085	6,946	6,181
HVAC Shell	13,402	31,486	26,946	21,471	16,065	11,427
Water Heating	5,444	6,957	7,689	8,217	8,642	8,759
Total	53,840	90,090	82,609	79,096	75,741	68,596
% of Forecasted Sales	3.7%	6.2%	5.7%	5.4%	5.2%	4.7%
Incremental Annual MW						
Total	7.4	12.7	12.0	11.4	10.9	10.2
% of Forecasted Demand	1.7%	2.9%	2.7%	2.6%	2.4%	2.3%
Cumulative Annual MWh³¹						
Appliances	3,722	8,540	13,780	19,046	24,047	28,656
Audit	61	119	146	167	180	187
Behavioral	9,042	9,526	10,557	11,781	13,440	15,404
HVAC Equipment	6,596	19,544	34,785	51,794	70,076	88,670
Lighting	13,134	34,830	31,327	36,243	36,889	38,538
Miscellaneous	161	376	655	1,003	1,423	1,914
New Construction	255	600	1,072	1,659	2,337	3,186
Plug Loads	2,023	5,626	10,059	15,144	20,912	24,448
HVAC Shell	13,402	44,560	70,192	89,281	102,002	109,345
Water Heating	5,444	12,339	19,814	27,624	35,612	43,506
Total	53,840	136,061	192,386	253,741	306,917	353,855
% of Forecasted Sales	3.7%	9.4%	13.3%	17.4%	20.9%	24.0%
Cumulative Annual MW						
Total	7.4	19.1	28.6	37.7	45.7	53.0
% of Forecasted Demand	1.7%	4.3%	6.4%	8.4%	10.2%	11.7%

Realistic Achievable Potential

Figure 4-4 illustrates the cumulative annual RAP results by end use across the 2020-2025 timeframe. Like maximum achievable potential, HVAC Shell and HVAC Equipment are the leading end uses. Water Heating, Lighting and Appliances also have significant realistic achievable potential.

²⁹ The behavioral end-use includes home energy reports and home energy management systems (HEMs).

³⁰ Miscellaneous consists of pool heater, efficient pool pumps, motors and timers, and well pumps.

³¹ 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.

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

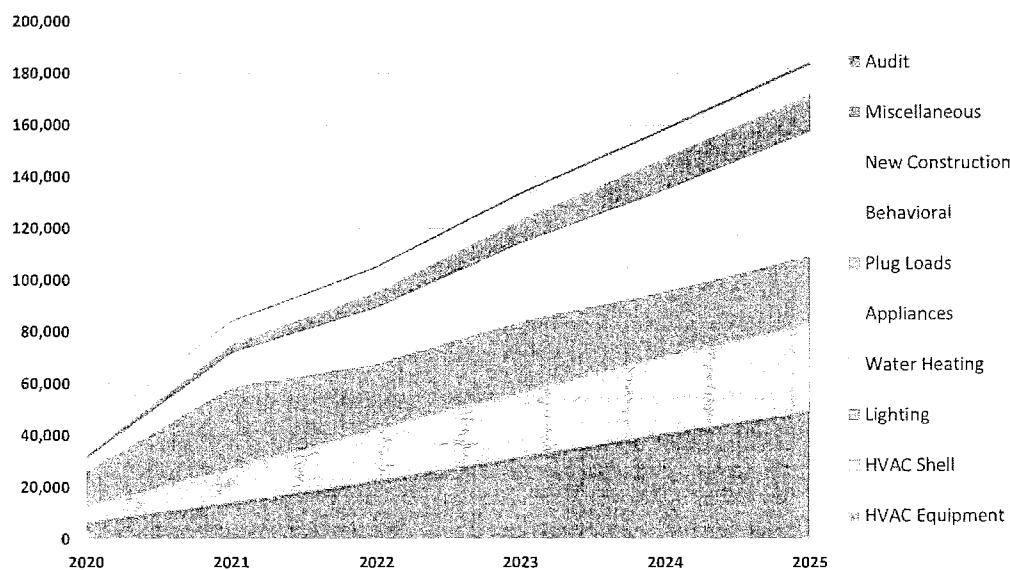


Table 4-6 provides the incremental and cumulative annual RAP across the 2020-2025 timeframe. Lighting and behavioral savings are leading end-uses of incremental RAP in the early years, and HVAC Shell, HVAC Equipment, and Water Heating increase throughout the six-year timeframe.

TABLE 4-6 RESIDENTIAL ELECTRIC RAP BY END-USE

End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Appliances	2,364	3,363	3,692	3,844	3,902	3,794
Audit	39	78	93	108	121	131
Behavioral ³²	8,061	7,657	7,661	7,651	7,698	8,093
HVAC Equipment	5,848	7,985	8,594	9,039	9,321	9,579
Lighting	14,292	17,399	9,794	7,875	6,298	3,575
Miscellaneous ³³	128	153	176	200	226	252
New Construction	184	209	244	263	272	314
Plug Loads	1,267	2,394	2,688	2,922	3,799	3,433
HVAC Shell	6,246	7,198	6,529	5,752	4,960	4,234
Water Heating	2,748	4,454	4,880	5,160	5,417	5,547
Total	41,177	50,889	44,349	42,814	42,014	38,952
% of Forecasted Sales	2.9%	3.5%	3.1%	2.9%	2.9%	2.6%
Incremental Annual MW						
Total	5.5	6.9	6.5	6.4	6.3	6.1
% of Forecasted Demand	1.2%	1.6%	1.5%	1.4%	1.4%	1.3%

³² The behavioral end-use includes home energy reports and home energy management systems (HEMs).

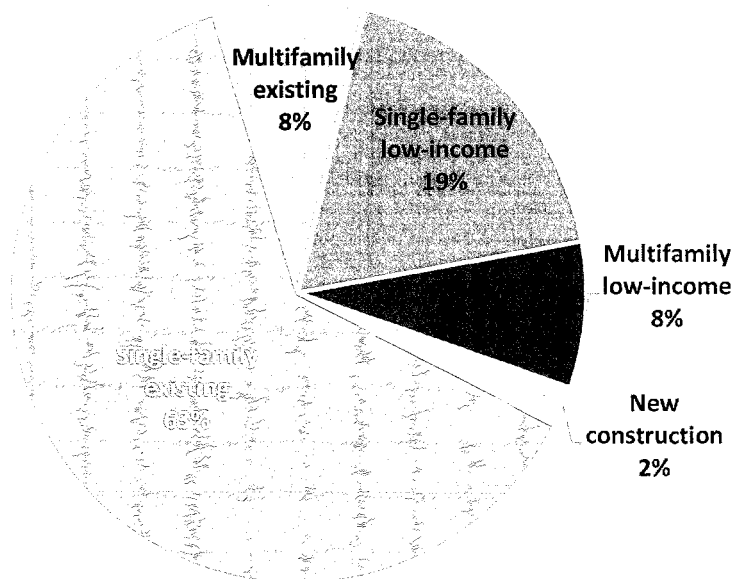
³³ Miscellaneous consists of pool heater, efficient pool pumps, motors and timers, and well pumps.

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End Use	2020	2021	2022	2023	2024	2025
Cumulative Annual MWh³⁴						
Appliances	2,364	5,727	9,388	13,177	16,990	20,708
Audit	39	78	93	108	121	131
Behavioral	8,061	8,159	8,496	8,768	9,179	9,711
HVAC Equipment	5,848	13,820	22,375	31,268	40,402	49,002
Lighting	14,292	31,875	26,081	27,825	25,847	27,162
Miscellaneous	128	281	456	657	882	1,135
New Construction	184	393	636	899	1,171	1,485
Plug Loads	1,267	3,661	6,349	9,270	12,634	14,534
HVAC Shell	6,246	13,364	19,709	25,173	29,755	33,555
Water Heating	2,748	7,180	11,950	16,926	22,045	27,226
Total	41,177	84,538	105,533	134,072	159,025	184,648
% of Forecasted Sales	2.9%	5.9%	7.3%	9.2%	10.8%	12.5%
Cumulative Annual MW						
Total	5.5	11.5	15.8	20.4	24.8	28.9
% of Forecasted Demand	1.2%	2.6%	3.6%	4.6%	5.5%	6.4%

Figure 4-5 illustrates a market segmentation of the RAP in the residential sector by 2025. 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 nearly 30% of the RAP.³⁵

FIGURE 4-5 2025 RESIDENTIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT



³⁴ 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.

³⁵ The low-income measures in the RAP analysis did not have to pass the UCT.

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RAP Benefits & Costs

Table 4-7 provides the net present value benefits and cost, as calculated using the UCT, across the 2020-2025 timeframe for the RAP scenario. The overall UCT ratio is 1.1. However, if low-income measures were removed, the overall UCT ratio would be nearly 2.0.

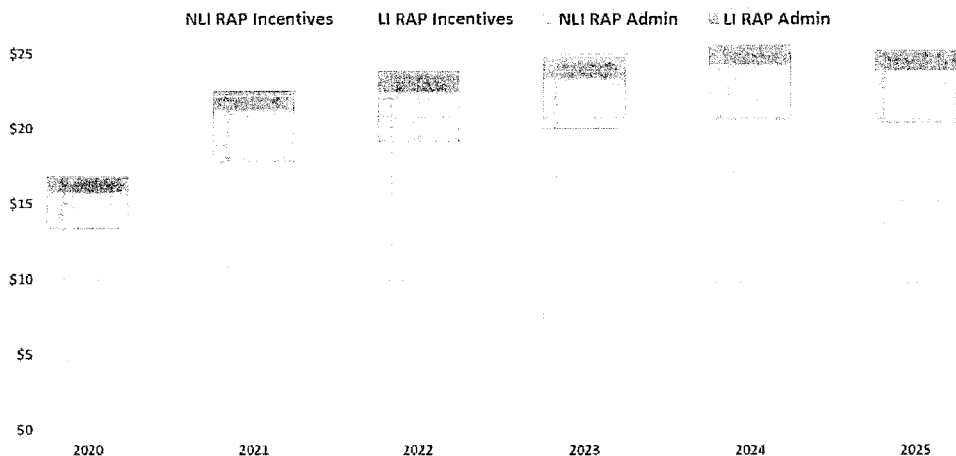
TABLE 4-7 RESIDENTIAL NPV BENEFITS & COSTS RAP BY END-USE (\$ IN MILLIONS)

End Use	NPV Benefits	NPV Costs	UCT Ratio
Overall Results			
Appliances	\$24.8	\$24.1	1.03
Audit	\$0.1	\$2.8	0.04
Behavioral	\$10.9	\$5.1	2.14
HVAC Equipment	\$88.5	\$107.3	0.82
Lighting	\$27.3	\$11.7	2.33
Miscellaneous	\$5.1	\$1.3	3.95
New Construction	\$3.1	\$0.7	4.11
Plug Loads	\$12.8	\$11.2	1.15
HVAC Shell	\$42.0	\$52.8	0.80
Water Heating	\$36.7	\$17.8	2.06
Total	\$251.3	\$234.8	1.07
Excluding Low-Income			
Appliances	\$18.0	\$10.0	1.80
Audit	\$0.0	\$0.0	0.00
Behavioral	\$10.9	\$5.1	2.14
HVAC Equipment	\$62.8	\$27.4	2.29
Lighting	\$25.4	\$10.4	2.44
Miscellaneous	\$5.1	\$1.3	3.95
New Construction	\$3.1	\$0.7	4.11
Plug Loads	\$12.6	\$9.8	1.29
HVAC Shell	\$17.2	\$13.8	1.25
Water Heating	\$34.5	\$17.0	2.02
Total	\$189.5	\$95.4	1.99

Figure 4-6 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the 2020-2025 timeframe. These budgets are further divided into low-income ("LI") and not low-income ("NLI") components. The low-income incentive portion of the budget ranges from 57% to 62% of the total budget from 2020 to 2025. RAP budgets rise to about \$25 million after four years.

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FIGURE 4-6 ANNUAL BUDGETS FOR RESIDENTIAL RAP (\$ IN MILLIONS)



5 Commercial Energy Efficiency Potential

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

5.1 SCOPE OF MEASURES & END USES ANALYZED

There were 222 total electric measures included in the analysis. Table 5-1 provides the number of measures by end-use and fuel type (the full list of commercial measures is provided in Appendix C). The measure list was developed based on a review of current Vectren 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 COMMERCIAL ENERGY EFFICIENCY MEASURES – BY FUEL TYPE

End Use	Number of Unique Measures
Space Heating	32
Cooling	76
Ventilation	8
Water Heating	14
Lighting	26
Cooking	7
Refrigeration	23
Office Equipment	14
Behavioral	3
Other	19

5.2 COMMERCIAL ELECTRIC POTENTIAL

Figure 5-1 provides the technical, economic, MAP and RAP results for the 6-year, 10-year, and 20-year timeframes. The 6-year technical potential is 22.1% of forecasted sales, and the economic potential is 20.0% of forecasted sales. The 6-year MAP is 14.8% and the RAP is 6.3%.

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

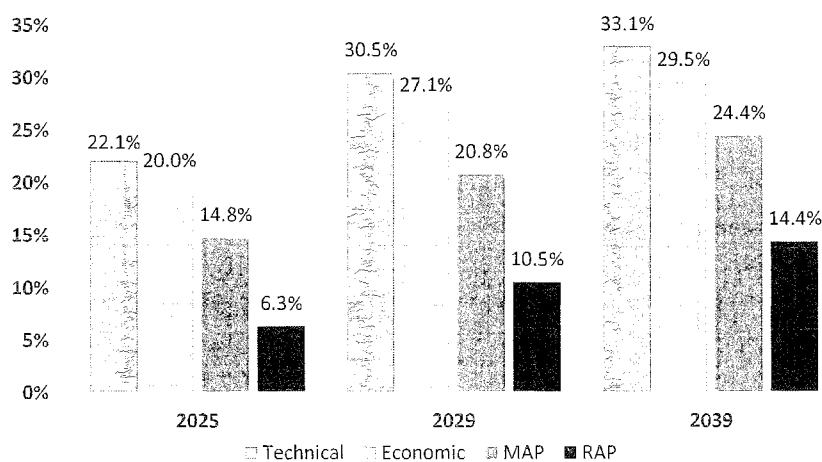


Table 5-2 provides cumulative annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The RAP reaches 6.3% after six years.

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TABLE 5-2 COMMERCIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	44,537	90,258	139,200	189,608	237,091	280,925
Economic	41,327	83,264	127,773	173,145	215,118	253,284
MAP	26,345	55,895	88,639	123,072	156,473	187,460
RAP	10,311	21,974	35,168	49,609	64,869	80,454
Forecasted Sales	1,235,560	1,237,950	1,244,360	1,251,998	1,263,383	1,269,201
Energy Savings (as % of Forecast)						
Technical	3.6%	7.3%	11.2%	15.1%	18.8%	22.1%
Economic	3.3%	6.7%	10.3%	13.8%	17.0%	20.0%
MAP	2.1%	4.5%	7.1%	9.8%	12.4%	14.8%
RAP	0.8%	1.8%	2.8%	4.0%	5.1%	6.3%

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 ranges from 0.8% to 1.4% per year over the next six years.

TABLE 5-3 COMMERCIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	44,537	48,599	52,397	54,755	54,631	55,436
Economic	41,327	44,816	47,926	49,670	49,022	49,453
MAP	26,345	30,503	34,404	37,095	37,636	38,255
RAP	10,311	12,122	13,911	15,609	16,770	17,811
Forecasted Sales	1,235,560	1,237,950	1,244,360	1,251,998	1,263,383	1,269,201
Energy Savings (as % of Forecast)						
Technical	3.6%	3.9%	4.2%	4.4%	4.3%	4.4%
Economic	3.3%	3.6%	3.9%	4.0%	3.9%	3.9%
MAP	2.1%	2.5%	2.8%	3.0%	3.0%	3.0%
RAP	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%

Technical & Economic Potential

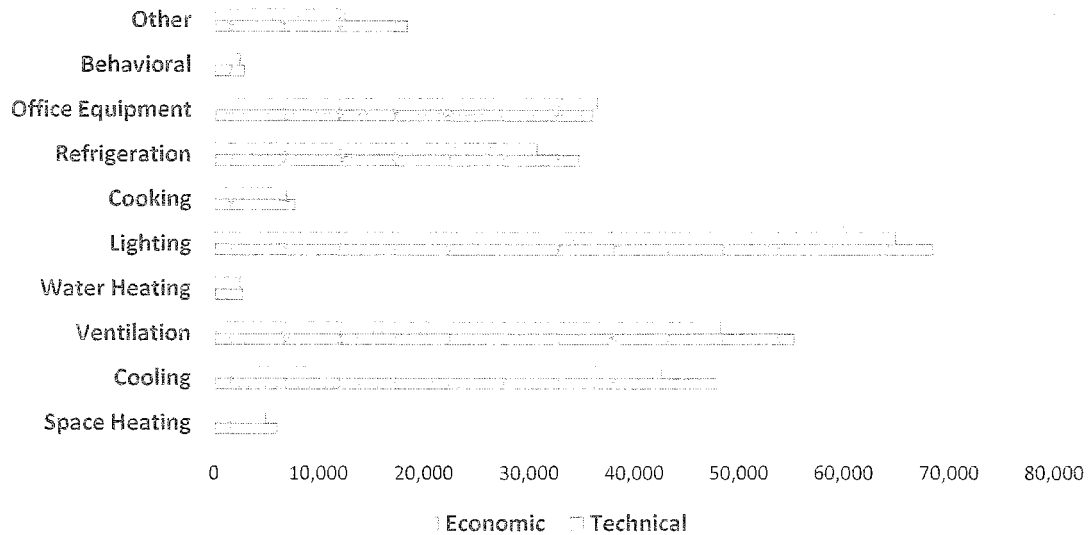
Table 5-4 provides cumulative annual technical and economic potential results from 2020-2025. Figure 5-2 shows a comparison of the technical and economic potential (6-year) by end use. Lighting, Ventilation, and Cooling are the leading stand-alone end uses among technical and economic potential.

TABLE 5-4 TECHNICAL & ECONOMIC COMMERCIAL ELECTRIC POTENTIAL

	2020	2021	2022	2023	2024	2025
Energy (MWh)						
Technical	44,537	90,258	139,200	189,608	237,091	280,925
Economic	41,327	83,264	127,773	173,145	215,118	253,284
Peak Demand (MW)						
Technical	6	12	18	24	30	35
Economic	4	9	14	19	23	28

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FIGURE 5-2 6-YEAR TECHNICAL AND ECONOMIC COMMERCIAL ELECTRIC POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure 5-3 illustrates the cumulative annual MAP results by end use across the 2020-2025 timeframe. Like technical and economic potential, Lighting, Ventilation, and Cooling are the leading end uses. Refrigeration and Office Equipment also have significant maximum achievable potential.

FIGURE 5-3 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) MAP POTENTIAL BY END-USE

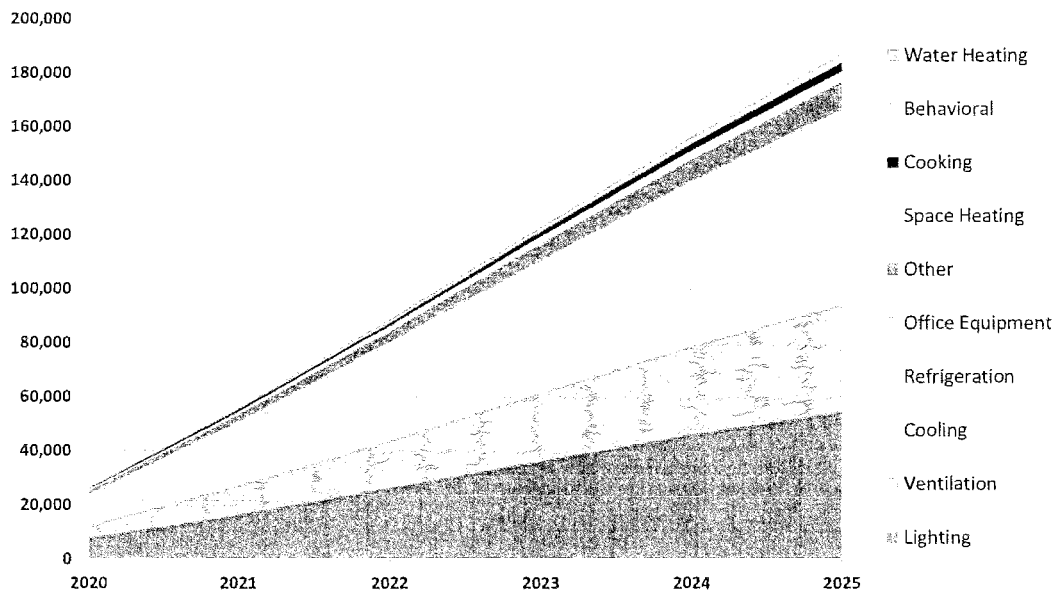


Table 5-5 provides the incremental and cumulative annual MAP across the 2020-2025 timeframe. The incremental MAP ranges from 2.1% to 3.0% of forecasted sales across the six-year timeframe. Cumulative annual MAP rises to 14.8% by 2025.

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TABLE 5-5 COMMERCIAL ELECTRIC MAP BY END-USE

End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Space Heating	567	663	729	740	699	619
Cooling	4,588	5,218	5,739	6,375	6,441	6,118
Ventilation	5,063	6,071	7,004	7,569	7,496	6,806
Water Heating	140	183	228	268	301	336
Lighting	7,338	8,570	9,628	10,120	9,750	8,608
Cooking	292	390	495	600	696	780
Refrigeration	3,843	4,502	4,993	5,237	5,245	6,009
Office Equipment	3,157	3,002	2,882	2,853	2,956	4,530
Behavioral	201	264	533	676	1,045	1,277
Other	1,156	1,641	2,175	2,657	3,006	3,173
Total	26,345	30,503	34,404	37,095	37,636	38,255
% of Forecasted Sales	2.1%	2.5%	2.8%	3.0%	3.0%	3.0%
Incremental Annual MW						
Total	2.1	2.5	2.9	3.0	3.1	2.9
% of Forecasted Demand	0.7%	0.8%	0.9%	1.0%	1.0%	1.0%
Cumulative Annual MWh						
Space Heating	567	1,230	1,959	2,699	3,398	4,017
Cooling	4,588	9,806	15,545	21,516	27,457	32,979
Ventilation	5,063	11,134	18,138	25,707	33,203	40,009
Water Heating	140	323	551	819	1,120	1,441
Lighting	7,338	15,908	25,535	35,656	45,406	54,014
Cooking	292	683	1,178	1,777	2,474	3,254
Refrigeration	3,843	7,617	11,630	15,621	19,368	22,748
Office Equipment	3,157	6,159	9,040	11,893	14,152	16,551
Behavioral	201	452	769	1,161	1,648	2,219
Other	1,156	2,583	4,294	6,222	8,249	10,228
Total	26,345	55,895	88,639	123,072	156,473	187,460
% of Forecasted Sales	2.1%	4.5%	7.1%	9.8%	12.4%	14.8%
Cumulative Annual MW						
Total	2.1	4.6	7.3	10.3	13.2	16.0
% of Forecasted Demand	0.7%	1.5%	2.4%	3.4%	4.4%	5.3%

Realistic Achievable Potential

Figure 5-4 illustrates the cumulative annual RAP results by end use across the 2020-2025 timeframe. Like maximum achievable potential, Lighting, Ventilation, and Cooling are the leading end uses. Refrigeration and Office Equipment also have significant realistic achievable potential.

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

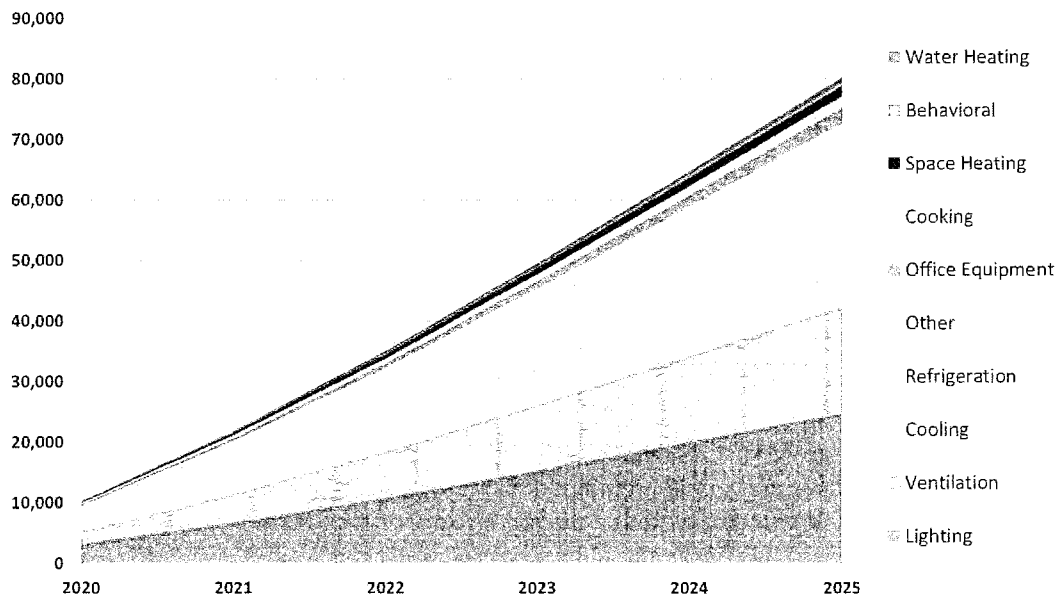


Table 5-6 provides the incremental and cumulative annual RAP across the 2020-2025 timeframe. The incremental RAP ranges from 0.8% to 1.4% of forecasted sales across the six-year timeframe. Cumulative annual RAP rises to 6.3% by 2025.

TABLE 5-6 COMMERCIAL ELECTRIC RAP BY END-USE

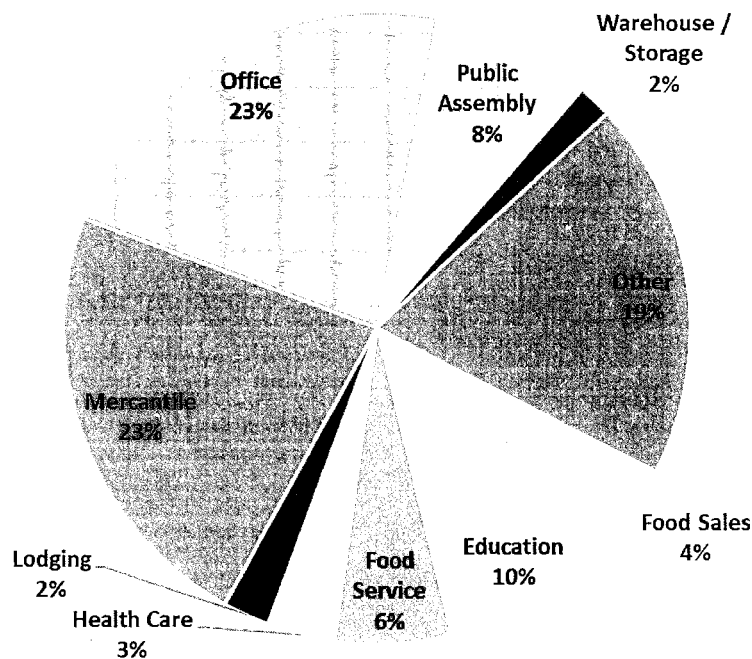
End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Space Heating	240	271	297	311	314	308
Cooling	1,955	2,170	2,379	2,738	2,852	2,874
Ventilation	2,232	2,616	2,951	3,231	3,377	3,387
Water Heating	77	97	117	137	156	180
Lighting	3,016	3,565	4,067	4,470	4,718	4,750
Cooking	198	247	299	352	404	455
Refrigeration	1,809	2,097	2,361	2,574	2,744	3,268
Office Equipment	220	280	364	463	571	701
Behavioral	57	80	169	227	353	456
Other	507	700	907	1,106	1,282	1,433
Total	10,311	12,122	13,911	15,609	16,770	17,811
% of Forecasted Sales	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%
Incremental Annual MW						
Total	0.9	1.0	1.3	1.9	2.9	4.6
% of Forecasted Demand	0.3%	0.3%	0.4%	0.6%	1.0%	1.5%
Cumulative Annual MWh						
Space Heating	240	511	808	1,119	1,433	1,741
Cooling	1,955	4,125	6,504	9,030	11,641	14,251
Ventilation	2,232	4,848	7,799	11,029	14,406	17,793
Water Heating	77	174	291	428	584	756

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End Use	2020	2021	2022	2023	2024	2025
Lighting	3,016	6,581	10,648	15,117	19,835	24,585
Cooking	198	444	743	1,095	1,499	1,954
Refrigeration	1,809	3,530	5,407	7,380	9,403	11,423
Office Equipment	220	500	864	1,327	1,898	2,599
Behavioral	57	133	240	381	556	774
Other	507	1,127	1,864	2,702	3,614	4,577
Total	10,311	21,974	35,168	49,609	64,869	80,454
% of Forecasted Sales	0.8%	1.8%	2.8%	4.0%	5.1%	6.3%
Cumulative Annual MW						
Total	0.9	1.9	3.1	4.3	5.7	7.0
% of Forecasted Demand	0.3%	0.6%	1.0%	1.4%	1.9%	2.3%

Figure 5-5 illustrates a market segmentation of the RAP in the commercial sector by 2025. Mercantile, Office, and Education are the leading building types.

FIGURE 5-5 2025 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT



RAP Benefits & Costs

Table 5-7 provides the net present value benefits and cost, as calculated using the UCT, across the 2020-2025 timeframe for the RAP scenario. Lighting and Cooking are the most cost-effective end-uses, and Cooling also provides significant NPV benefits.

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

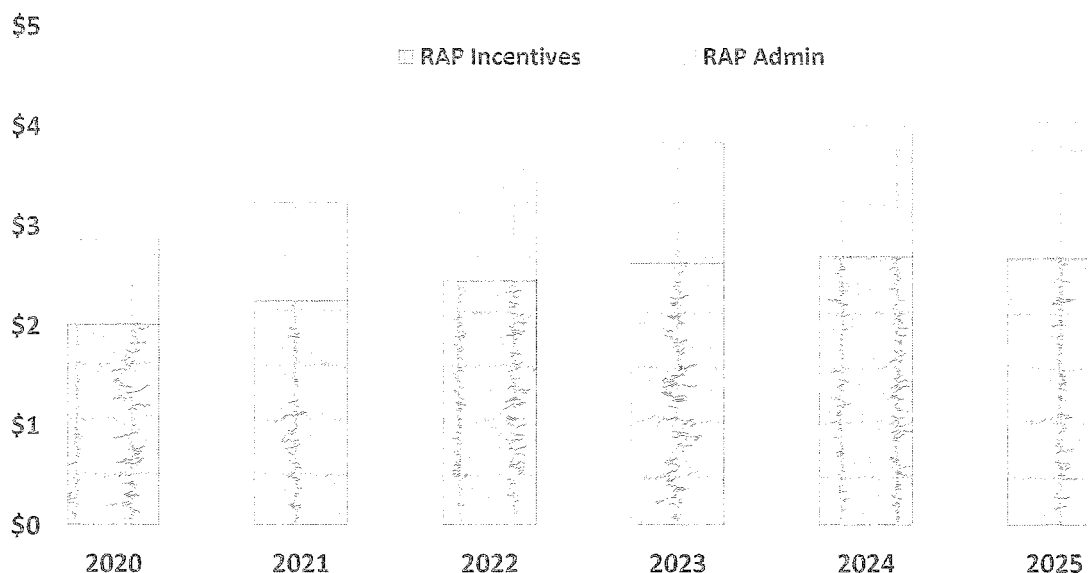
End Use	NPV Benefits	NPV Costs	UCT Ratio
Space Heating	\$0.62	\$1.12	0.55
Cooling	\$9.94	\$3.09	3.21
Ventilation	\$7.94	\$5.05	1.57
Water Heating	\$0.21	\$0.08	2.60

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End Use	NPV Benefits	NPV Costs	UCT Ratio
Lighting	\$11.03	\$6.03	1.83
Cooking	\$0.69	\$0.34	2.06
Refrigeration	\$3.45	\$1.33	2.59
Office Equipment	\$0.88	\$0.48	1.85
Behavioral	\$0.11	\$0.08	1.33
Other	\$1.95	\$0.53	3.67
Total	\$36.8	\$18.1	2.03

Figure 5-6 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the 2020-2025 timeframe. The incentives rise from \$2.0 million to \$2.7 million, and overall budgets rise from \$2.9 million to \$4.1 million by 2025.

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



5.3 COMMERCIAL POTENTIAL INCLUDING OPT-OUT CUSTOMERS

Table 5-8 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 5.2. The cumulative annual energy savings across the 20-year study timeframe are also shown in the far-right column. Table 5-9 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 cumulative annual energy savings across the 20-year study timeframe are also shown in the far-right column.

The 20-year RAP is 17.8 GWh excluding opt-out customers. This figure rises to 20.0 GWh with opt-out customers included.

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TABLE 5-8 COMMERCIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY – EXCLUDING OPT-OUT CUSTOMERS

	2020	2021	2022	2023	2024	2025	2025 (cumulative)
MWh							
Technical	44,537	48,599	52,397	54,755	54,631	55,436	465,610
Economic	41,327	44,816	47,926	49,670	49,022	49,453	415,838
MAP	26,345	30,503	34,404	37,095	37,636	38,255	344,315
RAP	10,311	12,122	13,911	15,609	16,770	17,811	202,365
Forecasted Sales	1,235,560	1,237,950	1,244,360	1,251,998	1,263,383	1,269,201	1,408,342
%							
Technical	3.6%	3.9%	4.2%	4.4%	4.3%	4.4%	33.1%
Economic	3.3%	3.6%	3.9%	4.0%	3.9%	3.9%	29.5%
MAP	2.1%	2.5%	2.8%	3.0%	3.0%	3.0%	24.4%
RAP	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%	14.4%

TABLE 5-9 COMMERCIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY – INCLUDING OPT-OUT CUSTOMERS³⁶

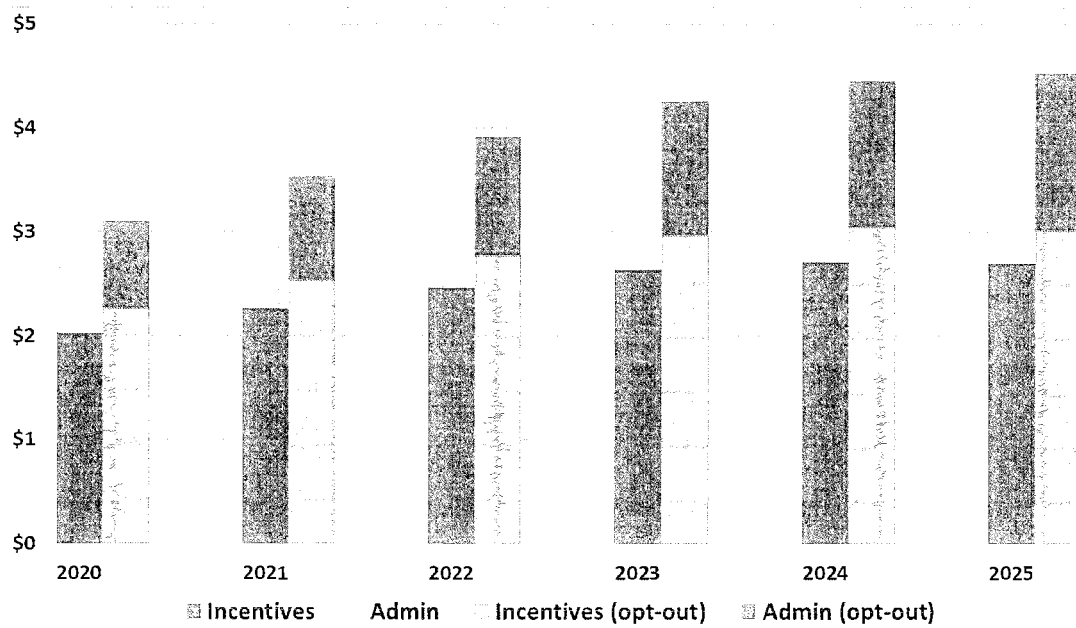
	2020	2021	2022	2023	2024	2025	2025 (cumulative)
MWh							
Technical	50,170	54,751	59,038	61,705	61,577	62,517	524,715
Economic	46,545	50,469	53,966	55,928	55,202	55,716	468,265
MAP	29,659	34,334	38,719	41,744	42,354	43,062	387,577
RAP	11,578	13,618	15,630	17,541	18,846	20,006	227,568
Forecasted Sales	1,390,224	1,392,929	1,400,166	1,408,787	1,421,633	1,428,202	1,585,207
%							
Technical	3.6%	3.9%	4.2%	4.4%	4.3%	4.4%	33.1%
Economic	3.3%	3.6%	3.9%	4.0%	3.9%	3.9%	29.5%
MAP	2.1%	2.5%	2.8%	3.0%	3.0%	3.0%	24.4%
RAP	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%	14.4%

Figure 5-7 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 2020-2025 timeframe. The overall budgets without opt-out customers rise from \$2.9 million to \$4.1 million by 2025. The budgets with opt-out customers included increase from \$3.1 million to \$4.5 million by 2025.

³⁶ Due to limited number of commercial opt-out customers and minor changes in building segmentation, savings as a percentage of sales is negligible out to three decimal places.

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FIGURE 5-7 ANNUAL BUDGETS FOR COMMERCIAL RAP (\$ IN MILLIONS) – WITH AND WITHOUT OPT-OUT CUSTOMERS



6 Industrial Energy Efficiency Potential

This section provides the potential results for technical, economic, MAP and RAP for the industrial sector. Results are broken down by end use. The cost-effectiveness results and budgets for the RAP scenario are also provided. The results in this section exclude the savings and sales forecast associated with opt-out customers

6.1 SCOPE OF MEASURES & END USES ANALYZED

There were 165 total unique electric measures included in the analysis. Table 6-1 provides number of measures by end-use (the full list of industrial measures is provided in Appendix D). The measure list was developed based on a review of current Vectren 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 INDUSTRIAL ENERGY EFFICIENCY MEASURES – BY FUEL TYPE

End-Use	Number of Unique Measures
Computers & Office Equipment	6
Water Heating	6
Ventilation	7
Space Cooling	22
Space Heating	16
Cooking	7
Refrigeration	25
Lighting	20
Other	7
Machine Drive	21
Process Heating and Cooling	12
Agriculture	16

6.2 INDUSTRIAL ELECTRIC POTENTIAL

Figure 6-1 provides the technical, economic, MAP and RAP results for the 6-year, 10-year, and 20-year timeframes. The 6-year technical potential is 20.6% of forecasted sales, and the economic potential is 19.3% of forecasted sales. The 6-year MAP is 14.0% and the RAP is 6.7%.

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

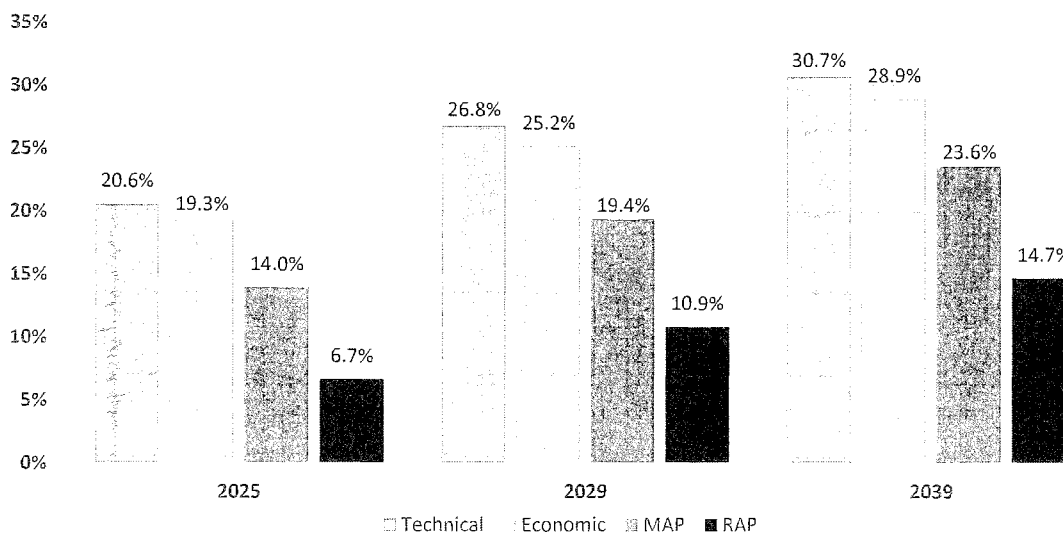


Table 6-2 provides cumulative annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The RAP reaches 6.7% after six years.

TABLE 6-2 INDUSTRIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	20,939	44,360	69,559	95,219	115,910	133,986
Economic	19,496	41,369	65,048	89,324	108,808	125,853
MAP	11,785	25,996	42,270	59,617	76,091	90,989
RAP	5,517	11,982	19,336	27,377	35,449	43,566
Forecasted Sales	640,023	641,915	644,247	646,702	649,006	651,371
Energy Savings (as % of Forecast)						
Technical	3.3%	6.9%	10.8%	14.7%	17.9%	20.6%
Economic	3.0%	6.4%	10.1%	13.8%	16.8%	19.3%
MAP	1.8%	4.0%	6.6%	9.2%	11.7%	14.0%
RAP	0.9%	1.9%	3.0%	4.2%	5.5%	6.7%

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 0.9% to 1.6% per year over the next six years.

TABLE 6-3 INDUSTRIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	20,939	24,019	26,570	27,937	28,192	27,324
Economic	19,496	22,471	25,050	26,553	26,985	26,293
MAP	11,785	14,679	17,322	19,105	20,003	19,927
RAP	5,517	6,688	7,846	8,854	9,799	10,567
Forecasted Sales	640,023	641,915	644,247	646,702	649,006	651,371
Energy Savings (as % of Forecast)						
Technical	3.3%	3.7%	4.1%	4.3%	4.3%	4.2%
Economic	3.0%	3.5%	3.9%	4.1%	4.2%	4.0%
MAP	1.8%	2.3%	2.7%	3.0%	3.1%	3.1%

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	2020	2021	2022	2023	2024	2025
MWh						
RAP	0.9%	1.0%	1.2%	1.4%	1.5%	1.6%

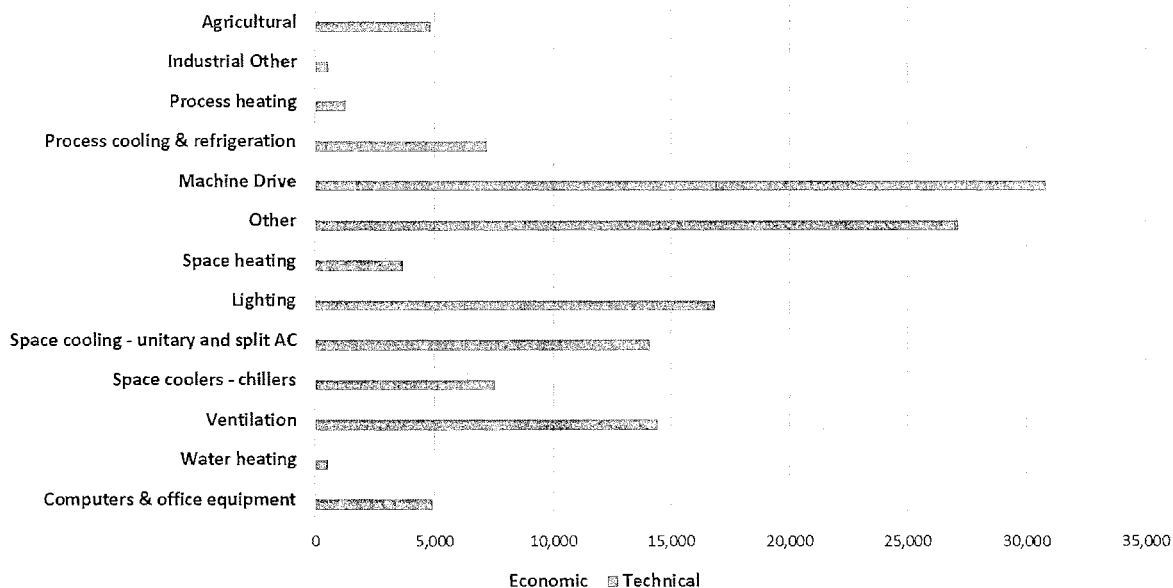
Technical & Economic Potential

Table 6-4 provides cumulative annual technical and economic potential results from 2020-2025. Figure 6-2 shows a comparison of the technical and economic potential (6-year) by end use. Machine drive, Lighting, and Ventilation are the leading stand-alone end uses among technical and economic potential.

TABLE 6-4 TECHNICAL AND ECONOMIC INDUSTRIAL ELECTRIC POTENTIAL

	2020	2021	2022	2023	2024	2025
Energy (MWh)						
Technical	20,939	44,360	69,559	95,219	115,910	133,986
Economic	19,496	41,369	65,048	89,324	108,808	125,853
Peak Demand (MW)						
Technical	5	10	15	21	25	29
Economic	4	9	14	19	24	27

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



Maximum Achievable Potential

Figure 6-3 illustrates the cumulative annual MAP results by end use across the 2020-2025 timeframe. Like technical and economic potential, Machine Drive, Lighting, and Ventilation are the leading end uses. Space cooling and process cooling & refrigeration also have significant maximum achievable potential.

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FIGURE 6-3 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) MAP POTENTIAL BY END-USE

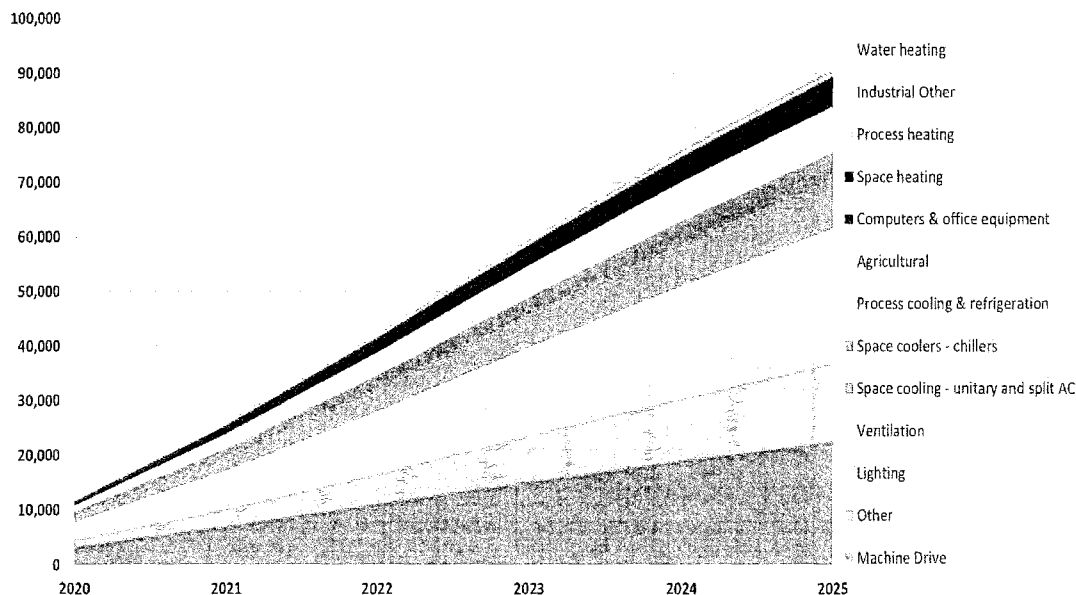


Table 6-5 provides the incremental and cumulative annual MAP across the 2020-2025 timeframe. The incremental MAP ranges from 1.8% to 3.1% of forecasted sales across the six-year timeframe. Cumulative annual MAP rises to 14.0% by 2025.

TABLE 6-5 INDUSTRIAL ELECTRIC MAP BY END-USE

End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Computers & office equipment	385	494	596	678	736	867
Water heating	40	41	44	49	55	60
Ventilation	1,311	1,626	1,898	2,011	1,926	1,675
Space coolers - chillers	677	808	912	949	971	886
Space cooling - unitary and split AC	1,271	1,503	1,696	1,768	1,814	1,631
Lighting	1,797	2,238	2,662	2,951	3,008	2,839
Space heating	328	390	444	464	480	435
Other	1,466	1,909	2,391	2,877	3,392	3,930
Machine Drive	3,166	3,928	4,588	5,017	5,150	5,093
Process cooling & refrigeration	681	931	1,165	1,362	1,511	1,617
Process heating	122	169	217	259	290	306
Industrial Other	47	56	64	73	83	93
Agricultural	494	587	644	645	588	495
Total	11,785	14,679	17,322	19,105	20,003	19,927
% of Forecasted Sales	1.8%	2.3%	2.7%	3.0%	3.1%	3.1%
Incremental Annual MW						
Total	3	3	4	4	4	4
% of Forecasted Demand	2.3%	2.8%	3.3%	3.7%	3.8%	3.8%

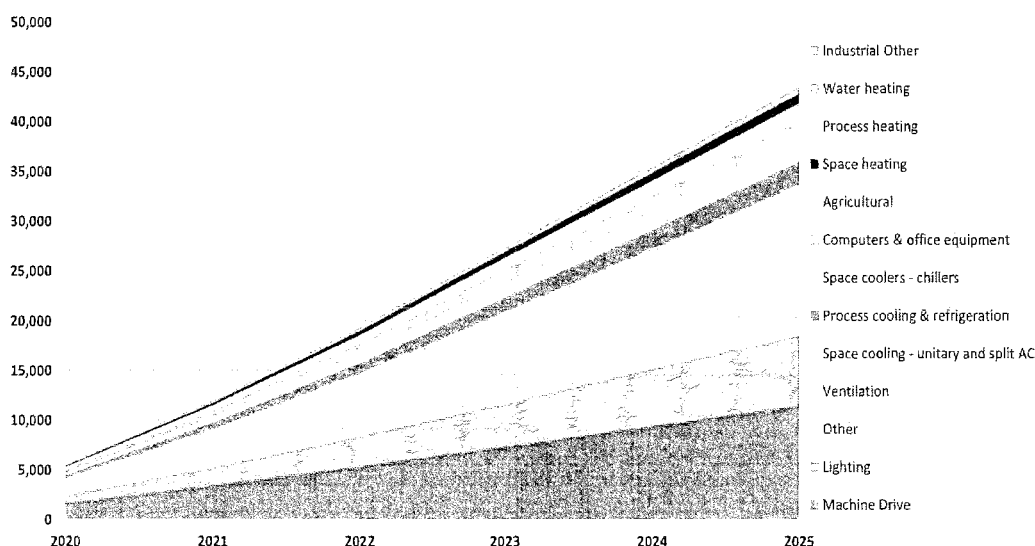
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End Use	2020	2021	2022	2023	2024	2025
Cumulative Annual MWh						
Computers & office equipment	385	878	1,474	2,153	2,630	3,056
Water heating	40	82	126	175	230	288
Ventilation	1,311	2,932	4,819	6,813	8,712	10,350
Space coolers - chillers	677	1,483	2,392	3,335	4,237	4,964
Space cooling - unitary and split AC	1,271	2,760	4,425	6,133	7,727	9,090
Lighting	1,797	3,972	6,492	9,204	11,859	14,223
Space heating	328	715	1,151	1,603	2,029	2,398
Other	1,466	3,374	5,764	8,638	11,542	14,682
Machine Drive	3,166	6,853	10,906	15,038	18,913	22,274
Process cooling & refrigeration	681	1,497	2,405	3,333	4,203	4,961
Process heating	122	271	443	625	801	956
Industrial Other	47	97	148	199	248	296
Agricultural	494	1,081	1,725	2,370	2,958	3,450
Total	11,785	25,996	42,270	59,617	76,091	90,989
% of Forecasted Sales	1.8%	4.0%	6.6%	9.2%	11.7%	14.0%
Cumulative Annual MW						
Total	3	6	9	13	17	20
% of Forecasted Demand	2.3%	5.0%	8.2%	11.6%	14.6%	17.4%

Realistic Achievable Potential

Figure 6-4 illustrates the cumulative annual RAP results by end use across the 2020-2025 timeframe. Like maximum achievable potential, Machine Drive, Lighting, and Ventilation are the leading end uses. Space cooling and process cooling & refrigeration also have significant realistic achievable potential.

FIGURE 6-4 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) RAP POTENTIAL BY END-USE



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Table 6-6 provides the incremental and cumulative annual RAP across the 2020-2025 timeframe. The incremental RAP ranges from 0.9% to 1.6% of forecasted sales across the six-year timeframe. Cumulative annual RAP rises to 6.7% by 2025.

TABLE 6-6 INDUSTRIAL ELECTRIC RAP BY END-USE

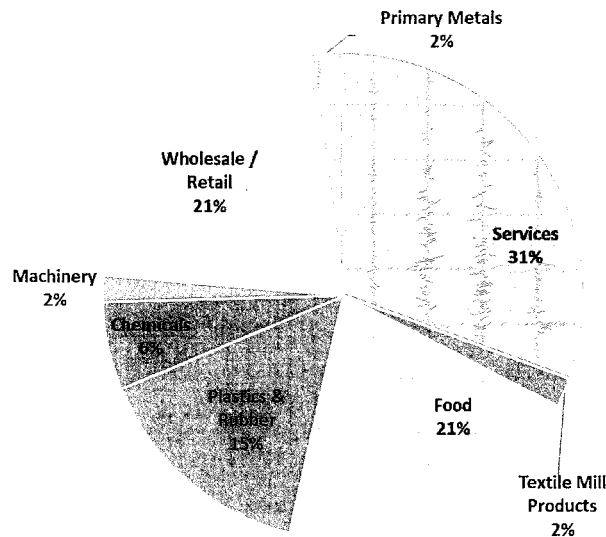
End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Computers & office equipment	263	316	367	415	457	544
Water heating	9	12	16	20	25	29
Ventilation	599	713	818	883	915	911
Space coolers - chillers	271	323	372	406	453	465
Space cooling - unitary and split AC	477	570	655	711	801	815
Lighting	892	1,083	1,268	1,419	1,532	1,592
Space heating	125	150	173	189	213	218
Other	649	834	1,046	1,269	1,502	1,772
Machine Drive	1,575	1,881	2,183	2,456	2,683	2,888
Process cooling & refrigeration	326	421	517	619	724	826
Process heating	56	75	95	116	136	156
Industrial Other	13	17	23	29	36	44
Agricultural	262	292	312	323	321	307
Total	5,517	6,688	7,846	8,854	9,799	10,567
% of Forecasted Sales	0.9%	1.0%	1.2%	1.4%	1.5%	1.6%
Incremental Annual MW						
Total	1	1	2	2	2	2
% of Forecasted Demand	1.1%	1.3%	1.5%	1.7%	1.9%	2.0%
Cumulative Annual MWh						
Computers & office equipment	263	579	945	1,360	1,623	1,873
Water heating	9	21	37	57	82	110
Ventilation	599	1,311	2,124	3,000	3,904	4,799
Space coolers - chillers	271	593	964	1,367	1,790	2,177
Space cooling - unitary and split AC	477	1,041	1,683	2,372	3,081	3,783
Lighting	892	1,948	3,157	4,478	5,863	7,253
Space heating	125	273	443	627	817	1,007
Other	649	1,484	2,530	3,798	5,051	6,463
Machine Drive	1,575	3,334	5,252	7,275	9,335	11,358
Process cooling & refrigeration	326	694	1,093	1,516	1,948	2,373
Process heating	56	121	195	276	361	445
Industrial Other	13	27	44	63	84	107
Agricultural	262	554	867	1,189	1,511	1,817
Total	5,517	11,982	19,336	27,377	35,449	43,566
% of Forecasted Sales	0.9%	1.9%	3.0%	4.2%	5.5%	6.7%

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End Use	2020	2021	2022	2023	2024	2025
Cumulative Annual MW						
Total	1	3	4	6	8	9
% of Forecasted Demand	1.1%	2.3%	3.7%	5.3%	6.8%	8.4%

Figure 6-5 illustrates a market segmentation of the RAP in the industrial sector by 2025. Food, plastics & rubber and chemicals are the leading market segments.

FIGURE 6-5 2025 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT³⁷



RAP Benefits & Costs

Table 6-7 provides the net present value benefits and cost, as calculated using the UCT, across the 2020-2025 timeframe for the RAP scenario. Machine Drive is the most cost-effective end-use, and Facility Lighting provides the greatest NPV benefits.

TABLE 6-7 INDUSTRIAL NPV BENEFITS AND COSTS RAP BY END-USE (\$ IN MILLIONS)

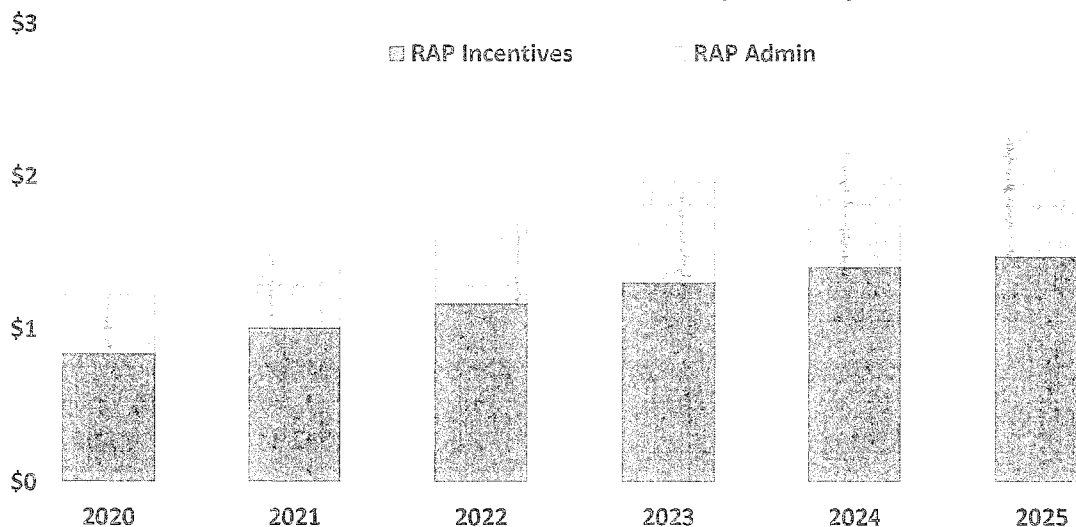
End Use	NPV Benefits	NPV Costs	UCT Ratio
Machine Drive	\$7.4	\$1.3	5.90
Facility HVAC	\$5.9	\$1.4	4.18
Facility Lighting	\$9.9	\$3.7	2.64
Other Facility Support	\$2.9	\$1.2	2.45
Process Cooling and Refrigeration	\$1.3	\$0.4	3.64
Process Heating	\$0.2	\$0.0	4.59
Other	\$3.6	\$1.2	3.04
Total	\$31.2	\$9.2	3.40

³⁷ "Wholesale/Retail" and "Services" industrial types include industrial buildings that devote a minority percentage of floor space to commercial activities like wholesale and retail trade, and construction, healthcare, education and accommodation & food service. Automotive related industries are divided between plastics, rubber, and machinery based on their NAICS codes.

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Figure 6-6 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the 2020-2025 timeframe. The incentives rise from \$0.8 million to \$1.5 million, and overall budgets rise from \$1.2 million to \$2.3 million by 2025.

FIGURE 6-6 ANNUAL BUDGETS FOR INDUSTRIAL RAP (\$ IN MILLIONS)



6.3 INDUSTRIAL POTENTIAL INCLUDING OPT-OUT CUSTOMERS

Table 6-8 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. Table 6-9 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.³⁸ The cumulative annual energy savings across the 20-year study timeframe are also shown in the far-right column.

The 20-year RAP is 14.7%, excluding opt-out customers. This figure drops to 13.5%, with opt-out customers included. Though the savings as a percentage of sales decreases, the energy savings of the RAP rises from 100,008 MWh to 334,101 MWh when the opt-out customers are included in the analysis.

TABLE 6-8 INDUSTRIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY – EXCLUDING OPT-OUT CUSTOMERS

	2020	2021	2022	2023	2024	2025	2020-2025 (cumulative)
MWh							
Technical	20,939	24,019	26,570	27,937	28,192	27,324	208,784
Economic	19,496	22,471	25,050	26,553	26,985	26,293	196,720
MAP	11,785	14,679	17,322	19,105	20,003	19,927	160,447
RAP	5,517	6,688	7,846	8,854	9,799	10,567	100,008
Forecasted Sales	640,023	641,915	644,247	646,702	649,006	651,371	679,928
Energy Savings (as % of Forecast)							
Technical	3.3%	3.7%	4.1%	4.3%	4.3%	4.2%	30.7%
Economic	3.0%	3.5%	3.9%	4.1%	4.2%	4.0%	28.9%
MAP	1.8%	2.3%	2.7%	3.0%	3.1%	3.1%	23.6%
RAP	0.9%	1.0%	1.2%	1.4%	1.5%	1.6%	14.7%

³⁸ Note the increase in the forecasted sales with opt-out customers included.

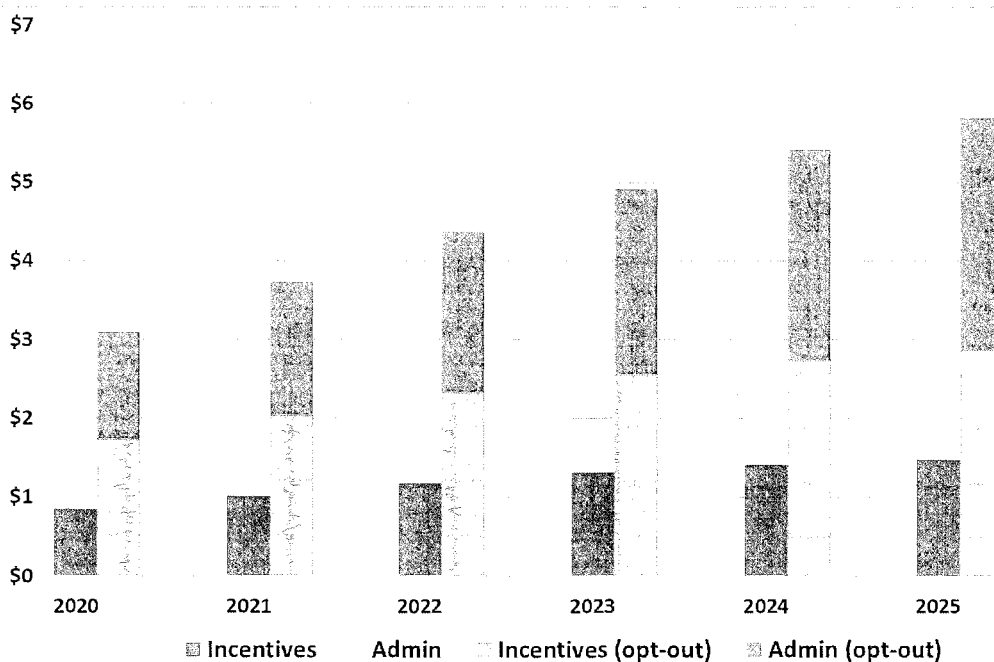
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TABLE 6-9 INDUSTRIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY – INCLUDING OPT-OUT CUSTOMERS

	2020	2021	2022	2023	2024	2025	2020-2025 (cumulative)
MWh							
Technical	66,750	78,664	89,185	95,702	97,760	95,516	688,359
Economic	63,335	74,992	85,566	92,390	94,842	92,995	659,191
MAP	41,085	51,432	61,105	67,856	71,118	70,784	521,639
RAP	19,324	23,576	27,883	31,695	35,218	38,149	334,101
Forecasted Sales	2,329,890	2,336,776	2,345,264	2,354,201	2,362,591	2,371,200	2,475,157
Energy Savings (as % of Forecast)							
Technical	2.9%	3.4%	3.8%	4.1%	4.1%	4.0%	27.8%
Economic	2.7%	3.2%	3.6%	3.9%	4.0%	3.9%	26.6%
MAP	1.8%	2.2%	2.6%	2.9%	3.0%	3.0%	21.1%
RAP	0.8%	1.0%	1.2%	1.3%	1.5%	1.6%	13.5%

Figure 6-8 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 2020-2025 timeframe. The overall budgets without opt-out customers rise from \$1.2 million to \$2.3 million by 2025. The budgets with opt-out customers included increase from \$3.1 million to \$5.8 million by 2025.

FIGURE 6-7 ANNUAL BUDGETS FOR INDUSTRIAL RAP (\$ IN MILLIONS) – WITH AND WITHOUT OPT-OUT CUSTOMERS



7 Demand Response and CVR Potential

This section provides the results of the technical, economic, MAP and RAP potential for the demand response analysis. Results are broken down by sector and program. The cost-effectiveness results and budgets for the MAP and RAP scenarios are also provided. Section 2.5 provides a description of the demand response methodology. Additional demand response results details are provided in Appendix G.

This section also provides the results of the CVR analysis. Energy and peak demand savings are provided, along with estimated budget requirements and the program benefits and costs.

7.1 TOTAL DEMAND RESPONSE POTENTIAL

Table 7-1 shows the technical, economic, and achievable (MAP and RAP) cumulative annual potential for the 2020-2025 timeframe. Achievable potential includes a participation rate to estimate the realistic number of customers that are expected to participate in each cost-effective demand response program option. These values are at the customer meter. The MAP assumes the maximum participation that would happen in the real-world, while the realistically achievable potential (RAP) discounts MAP by considering barriers to program implementation that could limit the amount of savings achieved.

TABLE 7-1 SUMMARY OF TECHNICAL, ECONOMIC, AND ACHIEVABLE POTENTIAL³⁹

Potential Level	2020 Savings (MWh)	2021 Savings (MWh)	2022 Savings (MWh)	2023 Savings (MWh)	2024 Savings (MWh)	2025 Savings (MWh)
Technical	399	368	333	312	304	300
Economic	367	348	322	306	299	295
MAP	23	64	110	131	138	139
RAP	7	20	38	49	53	55

Table 7-2 and Table 7-3 show the achievable potential savings for the 2020-2025 timeframe. Only those programs that were found to be cost-effective are included. Critical Peak Pricing (with Enabling Technologies) are the leading programs in both the commercial and residential sectors.

TABLE 7-2 MAP SAVINGS BY PROGRAM

Program	2020 Savings (MWh)	2021 Savings (MWh)	2022 Savings (MWh)	2023 Savings (MWh)	2024 Savings (MWh)	2025 Savings (MWh)
DLC AC Thermostat (Utility Incentivized)	2	3	5	7	8	10
DLC AC Thermostat (BYOT)	2	3	5	7	8	10
Residential Critical Peak Pricing (with Enabling Technologies)	8	24	49	64	68	68
Residential Critical Peak Pricing (without Enabling Technologies)	4	11	17	19	19	18
Residential Peak Time Rebates	5	10	10	6	5	4
Total	18	49	82	96	99	100

³⁹ The results in Table 7-1 do not account for any interactions with energy efficiency. In other words, the results are independent of the energy efficiency potential. Table 7-2 and Table 7-3 provide the DR total both without and with accounting for the interactions between energy efficiency potential and demand response potential. The "with energy efficiency interaction" results assume that energy efficiency potential comes first, then demand response.

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Program	2020 Savings (MMW)	2021 Savings (MMW)	2022 Savings (MMW)	2023 Savings (MMW)	2024 Savings (MMW)	2025 Savings (MMW)
DLC AC Thermostat (Utility Incentivized)	0	1	1	1	1	2
DLC AC Thermostat (BYOT)	0	1	1	1	1	2
Critical Peak Pricing (with Enabling Technologies)	4	11	23	31	33	33
Critical Peak Pricing (without Enabling Technologies)	1	2	3	3	3	3
Time of Use Rate	0	1	1	1	1	1
Total	5	15	28	36	38	39
Residential & Commercial Total (without energy efficiency interaction)	23	64	110	131	138	139
Residential & Commercial Total (with energy efficiency interaction)	22	61	103	121	124	123

TABLE 7-3 RAP SAVINGS BY PROGRAM

Program	2020 Savings (MMW)	2021 Savings (MMW)	2022 Savings (MMW)	2023 Savings (MMW)	2024 Savings (MMW)	2025 Savings (MMW)
DLC AC Thermostat (Utility Incentivized)	1	2	3	3	4	5
DLC AC Thermostat (BYOT)	1	2	3	3	4	5
Critical Peak Pricing (with Enabling Technologies)	2	6	12	16	18	18
Critical Peak Pricing (without Enabling Technologies)	1	3	5	7	7	7
Peak Time Rebates	1	3	6	8	8	8
Time of Use Rate	1	2	3	3	4	4
Residential Total	5	16	30	38	41	42
DLC AC Thermostat (Utility Incentivized)	0	0	0	0	0	1
DLC AC Thermostat (BYOT)	0	0	0	0	0	1
Critical Peak Pricing (with Enabling Technologies)	1	3	7	9	10	10
Critical Peak Pricing (without Enabling Technologies)	0	1	1	2	2	2
Commercial Total	1	4	8	11	12	12
Residential & Commercial Total (without energy efficiency interaction)	7	20	38	49	53	55
Residential & Commercial Total (with energy efficiency interaction)	7	19	37	47	51	51

Benefits & Costs

Table 7-4 and Table 7-5 show the MAP and RAP budget requirement (for only cost-effective programs) across the 2020-2025 timeframe that would be required to achieve the cumulative annual potential for each of the thermostat scenarios. GDS assumed that the Utility Incentivized Scenario would be combined with the existing energy efficiency smart thermostat program, so those customers would already have thermostats installed. Therefore, there would be no additional incentives or equipment costs for those customers. For the BYOT program, GDS assumed there would be a \$75 one-time credit⁴⁰ for each new participant. The current and future hardware and software cost of a Demand Response Management System and the cost of non-equipment incentives are included in these budgets.

TABLE 7-4 SUMMARY OF MAP BUDGET REQUIREMENTS

	Utility Incentivized	BYOT
2020	\$2,603,899	\$2,903,578
2021	\$3,795,482	\$4,142,869
2022	\$3,491,247	\$3,886,512
2023	\$1,824,460	\$2,267,934
2024	\$795,194	\$1,286,975
2025	\$524,919	\$1,065,077

TABLE 7-5 SUMMARY OF RAP BUDGET REQUIREMENTS

	Utility Incentivized	BYOT
2020	\$1,214,023	\$1,366,348
2021	\$1,519,553	\$1,695,871
2022	\$1,874,090	\$2,074,485
2023	\$1,218,690	\$1,443,328
2024	\$687,836	\$936,763
2025	\$517,151	\$790,398

Table 7-6 and Table 7-7 show the MAP and RAP residential net present values of the total benefits, costs, and savings, along with the UCT ratio for each program for the length of the study. The study period is 2020 to 2034 for MAP (15 years) and 2020 to 2039 for RAP (20 years). Two scenarios were looked at for the demand response study: control of air conditioners by smart thermostats where the utility provides the thermostat (utility incentivized), or where the customer provides their own thermostat (BYOT).

TABLE 7-6 MAP NPV BENEFITS, COSTS, AND UCT RATIOS FOR EACH DEMAND RESPONSE PROGRAM

	Program	NPV Benefits	NPV Costs	UCT Ratio
Residential	DLC AC Thermostat (Utility Incentivized)	\$17,194,723	\$1,983,943	8.67
	DLC AC Thermostat (BYOT)	\$17,194,723	\$8,202,189	2.10
	DLC AC Switch	\$444,312	\$981,072	0.45
	DLC Water Heaters	\$70,254	\$909,399	0.08
	DLC Pool Pumps	\$3,606	\$932,923	0.00
	Critical Peak Pricing (with Enabling Technologies)	\$71,995,462	\$4,229,589	17.02
	Critical Peak Pricing (without Enabling Technologies)	\$22,495,433	\$3,296,084	6.82

⁴⁰ Vectren South 2018 Electric DSM Operating Plan

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Program	NPV Benefits	NPV Costs	UCT Ratio
Peak Time Rebates	\$7,465,909	\$2,061,985	3.62
Time of Use Rates	\$827,243	\$1,655,665	0.50
DLC AC Thermostat (Utility Incentivized)	\$2,808,364	\$740,617	3.79
DLC AC Thermostat (BYOT)	\$2,808,364	\$1,217,479	2.31
DLC AC Switch	\$7,448	\$888,343	0.01
DLC Water Heaters	\$238	\$887,382	0.00
Commercial Critical Peak Pricing (with Enabling Technologies)	\$36,360,268	\$1,072,797	33.89
Commercial Critical Peak Pricing (without Enabling Technologies)	\$3,959,266	\$804,905	4.92
Commercial Real Time Pricing	\$166,288	\$627,540	0.26
Commercial Peak Time Rebates	\$327,957	\$818,521	0.40
Commercial Time of Use Rates	\$960,336	\$826,947	1.16

TABLE 7-7 RAP NPV BENEFITS, COSTS, AND UCT RATIOS FOR EACH DEMAND RESPONSE PROGRAM

Program	NPV Benefits	NPV Costs	UCT Ratio
DLC AC Thermostat (Utility Incentivized)	\$13,414,527	\$1,347,251	9.96
DLC AC Thermostat (BYOT)	\$13,414,527	\$5,676,540	2.36
DLC AC Switch	\$161,139	\$1,085,281	0.15
DLC Water Heaters	\$24,158	\$1,058,798	0.02
DLC Pool Pumps	\$703	\$1,101,271	0.00
Residential Critical Peak Pricing (with Enabling Technologies)	\$23,447,290	\$1,299,760	18.04
Residential Critical Peak Pricing (without Enabling Technologies)	\$10,175,975	\$1,383,206	7.36
Residential Peak Time Rebates	\$11,651,211	\$1,567,503	7.43
Residential Time of Use Rates	\$5,036,926	\$1,623,212	3.10
DLC AC Thermostat (Utility Incentivized)	\$1,332,037	\$752,800	1.77
DLC AC Thermostat (BYOT)	\$1,332,037	\$957,031	1.39
DLC AC Switch	\$305	\$1,051,229	0.00
DLC Water Heaters	\$41	\$1,051,193	0.00
Commercial Critical Peak Pricing (with Enabling Technologies)	\$13,997,560	\$706,486	19.81
Commercial Critical Peak Pricing (without Enabling Technologies)	\$2,562,131	\$697,914	3.67
Commercial Real Time Pricing	\$715,458	\$745,708	0.96
Commercial Peak Time Rebates	\$437,224	\$855,727	0.51
Commercial Time of Use Rates	\$725,868	\$803,613	0.90

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7.2 CVR POTENTIAL

Tables 7-8 and 7-9 show the respective incremental and cumulative annual CVR potential for the first six years of the study. Energy (MWh) and peak demand (kW) savings estimates are included in the tables.

TABLE 7-8. CVR INCREMENTAL ANNUAL POTENTIAL

	2020	2021	2022	2023	2024	2025
Projected MWh Savings	2,494	0	0	3,861	0	0
Projected kW Savings	449	0	0	695	0	0

TABLE 7-9. CVR CUMULATIVE ANNUAL POTENTIAL

	2020	2021	2022	2023	2024	2025
Projected MWh Savings	2,494	2,494	2,494	6,355	6,355	6,355
Projected kW Savings	449	449	449	1,144	1,144	1,144

Table 7-10 shows the annual budget requirements to run the CVR program with the East Side and Broadview substations. The capital cost of the East Side substation is \$1,350,000, and initial equipment and software costs of the Broadview station is \$1,550,000. The implementation costs for the East Side substation are \$139,748 per year, and \$163,225 for the Broadview substation (starting in 2023). Administrative costs are assumed to be \$40,000 for the entire CVR program in 2020 and escalates by 1.5% per year thereafter.

TABLE 7-10. ANNUAL CVR BUDGET REQUIREMENTS

	CVR Budget
2020	\$179,748
2021	\$180,348
2022	\$180,957
2023	\$344,810
2024	\$345,437
2025	\$346,074

Table 3-9 shows the NPV benefits and costs associated with the CVR program across the 20-yr timeframe of the study. The UCT ratio is 1.38.

TABLE 7-11. NPV BENEFITS, COSTS, AND UCT RATIO FOR CVR PROGRAM

Program	NPV Benefits	NPV Costs	UCT Ratio
CVR	\$4,687,972	\$3,407,160	1.38

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2020-2025 Integrated Electric Action Plan

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JANUARY 2019

1 Summary of Results

1.1 VECTREN'S ACTION PLAN

The Market Potential Study serves as the basis for developing Vectren's Action Plan. The Action Plan is designed to extract the insights and data from the Market Potential Study and translate them into opportunities to deliver to customers. The Action Plan provides guidance to mobilize the results of the Market Potential Study research and design program initiatives that provide a pathway to advance efforts that are reasonable and relevant in developing Vectren's portfolio. The following section lays out the process, principles, and elements of Vectren's portfolio of programs. A summary of the results for the proposed portfolio is also provided.

1.2 GUIDING PLANNING PRINCIPLES IN DEVELOPING ACTION PLAN OFFERINGS

Vectren's Energy Efficiency Action Plan was developed in accordance with a number of guiding principles and considerations. The process was built on using the most recent Market Potential Study as the foundation, and was then designed to incorporate industry best standards, implementer experiences, and projected changes in the market (such as codes and standards) in order to translate the insights and knowledge from the Market Potential Study into actionable energy efficiency programs for Vectren's planning purposes and customers.

A review of the key planning guidelines and considerations used to frame the Action Plan follows:

TABLE 1-1 KEY PLANNING GUIDELINES IN DEVELOPING THE ACTION PLAN

Plan Consideration	Explanation
Market Coverage	Consideration was given to crafting a portfolio of programs that offers opportunities for savings across all of Vectren's customer groups. This includes residential (single, multifamily and income qualified) as well as commercial and industrial markets.
Direct Link to the Market Potential Study	The Action Plan is directly linked to the Market Potential Study by using its market and cost data. It is acknowledged that there are differences between market and achievable potential due to market dynamics (net versus gross impacts), timeframe differences, proxy versus specific program delivery approaches, and budget realities. Wherever possible, the Market Potential Study serves as a primary reference source making it easier for Vectren to return to the Market Potential Study for added insights as conditions in the market change.
Leveraging Current Program Efforts	Efforts were directed at leveraging existing Vectren offerings to take advantage of market and trade ally understanding, to utilize existing market relationships, retain the relevant elements of programs already working well, and to continue promotional efforts (where relevant).
Introduce New Measures and Concepts	The approach actively looked at incorporating new, applicable measures deemed cost effective and suitable for Vectren's portfolio. This included the introduction of selected new measures in the existing prescriptive-type programs.
Cost Effectiveness Analysis	For planning purposes, each of the recommended programs must pass the Utility Cost Test (UCT) and the Total Resource Cost (TRC) tests, except for Income-Qualified Programs which do not need to meet cost-effectiveness tests in order to promote a greater social good. The cost-effectiveness results are reported for the UCT and the TRC tests. Each program is assessed separately to determine relative benefits and costs (in contrast to assessing each individual measure).
Income-Qualified Programs	Because income-qualified programs are not required to be cost-effective, the Market Potential Study did not screen out measures for income qualified programs based on any cost-effectiveness tests. The team used alternate guidelines for determining which measures would be included in the program. The team chose a "quality over quantity" approach and provided more services to each individual customer than in previous program years. To ensure that income-qualified programs did not overwhelm other energy efficiency program priorities, the team ensured that the overall program budget did not vastly exceed previous program budgets.
C&I Custom Program	Because the C&I Custom program utilizes engineering estimates for each project, customers can submit a wide range of projects through the program. Typically, C&I customers submit large projects through the program to provide an economy of scale for the company taking the time to

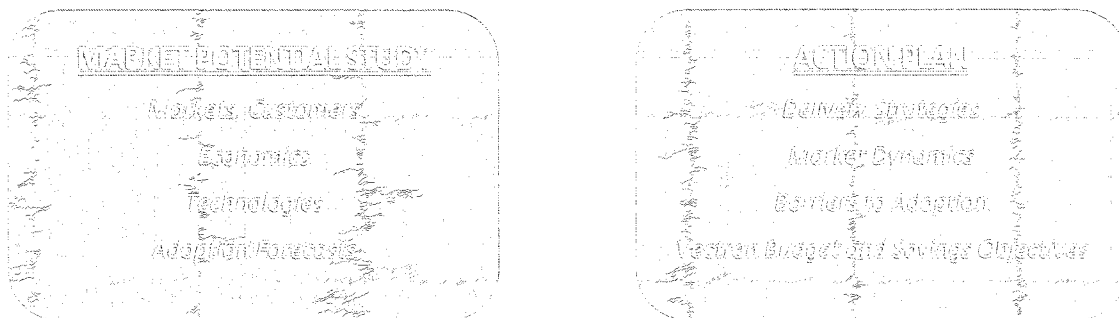
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Plan Consideration	Description
	complete program paperwork. The Market Potential Study, however, includes all measures that C&I customers may submit through the program no matter the size of the project. Due to this project sizing difference, the Market Potential Study estimates significantly higher savings than the team believed was achievable through the program. The team adjusted C&I Custom program participation and savings based on feedback from implementers and historical program participation.
Adoption Forecasts	Forecasts of customer adoption were reviewed and applied from the Market Potential Study in combination with the historical participation from Vectren's programs. Information was also captured from actual VEDI program experience from evaluation reporting, reliance on "like-utility" estimates in offering similar programs and discussions with implementers.
Impact of Codes and Standards	The savings presented in the Action Plan considers upcoming changes to the baseline. The residential lighting program serves as a good example, where the baseline is changing in 2020 due to the Energy Independence Security Act (EISA). Since 2010, first CFLs and then LEDs have claimed significant shares of the U.S. light bulb market. As a result, the energy efficiency of the average new light bulb sold in the U.S. has increased significantly. That means the savings that energy efficiency programs can claim for helping to install an efficient LED has decreased. Starting in 2020, LED (or equivalent lights) become the standard alternative, directly impacting the amount of savings available for customers changing out their bulbs. The elimination of savings from LED lighting is included in the Vectren portfolio starting in 2021-2022. A similar situation is evident in looking at savings estimates from electrically commutated motors (ECM) as part of furnaces. The standards for ECM motors are scheduled to increase in July 2019, resulting in a loss of reportable energy savings starting in 2020 from the measure.
Program Costs and Budgets	A budget that characterizes the estimated costs for delivering programs to customers is presented for each program. The costs include all participant incentive, planning, evaluation and implementation costs forecast for each year of program operation.
Electric and Natural Gas Integration	As a combination utility, some of Vectren's programs offer savings addressing both electric and natural gas reductions. Programs such as new construction, behavioral savings, multifamily, and income-qualified weatherization all include electric and gas savings. These programs follow the need to split program costs across fuel types while the cost-effectiveness results include benefits of electric and gas reductions. This effort was directed at areas of the Vectren service territory which offer both fuel types to customers. The specific impacts of these programs are provided in the individual program write-ups.

1.3 VECTREN ENERGY EFFICIENCY ACTION PLAN BACKGROUND

The development of the Action Plan is designed to translate the insights and information from the broader Market Potential Study analysis into discrete and specific offerings for Vectren's customers. The Market Potential Study and the Action Plan are related and share common values, but the Action Plan provides more detail, specificity and mobilization strategies.

The Action Plan outlines recommended electric programs for 2020-2025, a shorter timeframe than the potential research. The Action Plan lays out how to achieve the savings uncovered in the potential study research, shifting the broad and high-level forecast of savings opportunities in the Market Potential Study results into specific and actionable savings opportunities. An illustrative view between the Market Potential Study and the Action Plan elements follows:

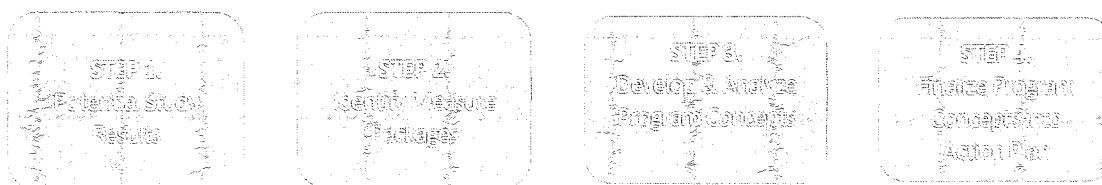


1.4 VECTREN ENERGY EFFICIENCY ACTION PLAN FRAMEWORK

The effort to develop Vectren's energy efficiency programs, for their planning purposes, follows a grounded and sequential process. The process was built on applying the recent market potential analytics as a starting point and, from there, developing program offerings that cost-effectively meet Vectren's planning and program objectives. An illustrative review of the process follows.

1.4.1 Approach

Our approach was based on conducting a series of sequential activities that take the top measures from the potential analyses and develop more detailed and defined concepts to better reflect likely delivery strategies and actual experience. This included packaging measures into programs to analyze and forecast adoption, economic impacts, and savings estimates. This approach is consistent with similar energy efficiency potential efforts and is detailed in the Guide for Conducting Energy Efficiency Potential Studies, prepared by the National Action Plan for Energy Efficiency (2007). These activities are discussed in more detail below.



1.4.1.1 Action Plan Activities

Step 1. Potential Study Results

The starting point for developing the programs in the Vectren Action Plan was the recently-completed Market Potential Study. This study provided a current assessment of the energy efficiency opportunities available in Vectren service territory and was built on the utility's most recent sales information, market characterization, and forecast of adoption using a number of scenarios and data on measure penetration, costs, energy savings, and overall economics. A key input used for the Action Plan was the identification of the relative savings impacts and cost and benefits for a large array of possible measures that were considered for the Vectren portfolio.

The focus on identifying relevant measures for further consideration in the Vectren portfolio was based on looking at the forecast impacts from both the Total Resource Cost (TRC) and the Utility Cost Test (UCT). Measures which passed either test were reviewed and screened to determine their applicability, market rationale, and viability to be packaged into programs for subsequent examination. The project team, working with Vectren, coordinated multiple meetings with staff and implementers to assist in our understanding of current and proposed DSM initiatives, details of Indiana and Vectren-specific markets, and the suitability of efficiency measures given the utility's customer base. For example, there were a number of retail consumer-related products that passed the relevant screening—such as energy efficient laptops, printers, SMART televisions, and monitors—but are not typically handled through utility intervention. Instead they are part of national standards and market efforts. The result was a list of 413 measures, deemed to be the most reasonable and relevant for further consideration by Vectren.

Step 2. Identify Measure Packages

Using the data and results of the MPS, relevant measures were bundled into packages to better reflect targeted end uses, typical trade ally involvement in customer transactions, and common delivery strategies. The combined packages of measures were designed to advance the analysis efforts and optimally spread delivery costs across a range of technologies. The packages were developed through discussions with Vectren staff, review of prior utility offerings and discussions with Vectren's implementors.

Step 3. Develop and Analyze Program Concepts

Measure packages were then combined into program concepts, designed to reflect program implementation. The concepts were developed through a series of interviews with Vectren's program implementors. These discussions

were designed to capture their insights and suggestions as what works best in Vectren’s market based on their experiences. Discussions were also conducted with Vectren staff to get a sense of prior offerings, to better understand program delivery experiences. Finally, effort was also directed at incorporating practices and findings from other utility experiences in Indiana and in the region. The results of this step provided inputs to the Action Plan modeling including: energy savings, program costs, participation and incentives. These elements are all key inputs into modeling the stream of benefits and costs and determine cost effectiveness.

Step 4. Finalize Offerings in Action Plan

The final program concepts and relevant information were incorporated into Vectren’s Action Plan document. The Action Plan provides the key information for required to implement desired programs.

A review of the key Action Plan data elements and sources follows:

TABLE 1-2 ACTION PLAN DATA ELEMENTS

Action Plan Component	Description
Energy Savings	Each program contains savings estimates for kWh, kW, and therms developed from the Market Potential Study analysis. Additional sources for the savings estimates include: the Indiana TRM, prior evaluation results from VEDI, prior DSM filings, and discussions with relevant implementers.
Technology Costs	Technology cost was obtained from the Market Potential Study analysis. Additional sources included prior evaluation results from VEDI and prior DSM filings.
Estimated Useful Lifetime	Estimates of useful lifetime (EUL) were based on the Market Potential Study analytics and the Indiana Measure Library. For programs with multiple measures, the program EUL was calculated using a weighted average of the number of each measure implemented.
Incentive Strategy	The specific incentive strategy including type (rebate, loan, POS reduction, manufacturer payment), and amount was determined from discussions with Vectren. There is a good history from prior VEDI DSM efforts to detail incentive strategy and amounts to move the market. The cost economics from the Participant Test were also used to gauge impacts.
Annual Adoption	Forecasts of customer adoption from the Market Potential Study were reviewed and adjustments were applied based on historical participation in Vectren’s programs, upcoming changes in codes and standards, actual performance reported in VEDI evaluation reporting, and “like-utility” estimates in offering similar programs.
NTG Impacts	NTG estimates from past evaluation studies were used for existing programs. Benchmarking against other Indiana utilities or “like utilities” was used for new initiatives. Discussions with implementers were also included.
Program Costs	Program budgets were developed using historical program cost data and past VEDI evaluations. Discussions with relevant implementation contractors also provided insight regarding typical utility management requirements and related costs.
Benefit-Cost Impacts	Each program concept also includes the impact of the relative costs and benefits for each initiative. The results include the forecast of benefit-costs from various perspectives: Participant test, Rate Impact test, Utility Cost test, and Total Resource Cost test.

2 Overview of Vectren's Energy Efficiency Portfolio

The following section outlines the portfolio of programs developed by Vectren, EMI Consulting, and GDS (referred to hereafter as “the team”). The section begins with a high-level summary of the recommended programs and then provides detailed participation estimates for each year of the Action Plan.

2.1 RECOMMENDED VECTREN ENERGY EFFICIENCY PROGRAM PORTFOLIO

The following table presents the recommended Vectren proposed portfolio. A more detailed program-by-program write-up is also provided in Section 3 to define each program’s overall design and incorporate relevant technology and market data to permit modeling of load impacts, budgets, and cost-effectiveness.

TABLE 2-1 SUMMARY OF DRAFT 2020-2025 ENERGY EFFICIENCY PROGRAMS

Program	Continuation from Previous Plan	Play or Expanded Offering	Pilot Program	Participant Type	Gas/Boiler/Integrated Services
Residential Lighting	X			Bulb	
Residential Prescriptive	X	X		Equipment / Appliance / Service	X
Residential New Construction	X			Home	X
Income Qualified Weatherization	X			Home	X
Energy Efficient Schools	X			Kit	X
Residential Behavioral Savings	X	X		Home	X
Appliance Recycling	X	X		Refrigerator/ Freezer	
Home Energy Assessment	X			Home	X
Food Bank	X	X		Bulb	X
CVR Residential	X			NA	
Home Energy Management Systems		X	X	Home	X
Smart Cycle (DLC Change Out)	X			Thermostat	
Bring Your Own Thermostat	X			Thermostat	
Commercial Prescriptive	X	X		Equipment / Appliance / Service	X
Commercial Custom	X	X		Project	X
Small Business	X	X		Project	X
CVR C&I	X			NA	

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2.2 SUMMARY OF ENERGY EFFICIENCY IMPACTS

An overall summary of results reflecting savings and costs is shown in Table 2-2 below. These results present an aggregation of all the programs, as well as the results by portfolio (Residential and Commercial/Industrial).

TABLE 2-2 VECTREN INDIANA ELECTRIC DSM 2020-2025 SAVINGS- ALL PROGRAMS

Year	New Participants in Year	Energy Savings in kWh	Summer kW Savings	Incentives (\$)	Program Costs (\$)	Indirect and Other Costs (\$)	Budget (\$)
2020	345,916	47,451	10,758	3,731	5,342	1,207	10,279
2021	382,684	49,716	10,653	3,814	5,724	1,547	11,085
2022	216,286	44,565	10,262	3,787	5,714	1,251	10,752
2023	135,923	45,375	10,907	3,551	5,867	1,253	10,670
2024	137,955	43,309	10,405	3,565	6,063	1,570	11,198
2025	138,078	43,244	10,683	3,563	6,116	1,279	10,959
Total	1,356,842	273,660	63,667	22,011	34,826	8,107	64,944

TABLE 2-3 VECTREN INDIANA ELECTRIC DSM 2020-2025 SAVINGS- RESIDENTIAL

Year	New Participants in Year	Energy Savings in kWh	Summer kW Savings	Incentives (\$)	Program Costs (\$)	Indirect and Other Costs (\$)	Budget (\$)
2020	302,908	22,880	5,784	1,321	3,860	582	5,763
2021	333,657	24,682	5,569	1,358	4,185	768	6,312
2022	162,737	18,353	4,926	1,316	4,118	515	5,949
2023	80,062	17,461	5,215	1,103	4,166	482	5,752
2024	81,637	16,186	4,879	1,166	4,297	587	6,050
2025	83,617	16,349	5,216	1,236	4,356	483	6,076
Total	1,044,618	115,911	31,588	7,502	24,983	3,418	35,902

TABLE 2-4 VECTREN INDIANA ELECTRIC DSM 2020-2025 SAVINGS- COMMERCIAL AND INDUSTRIAL

Year	New Participants in Year	Energy Savings in kWh	Summer kW Savings	Incentives (\$)	Program Costs (\$)	Indirect and Other Costs (\$)	Budget (\$)
2020	43,008	24,571	4,975	2,410	1,482	625	4,516
2021	49,027	25,034	5,084	2,456	1,539	779	4,773
2022	53,549	26,212	5,336	2,471	1,596	736	4,803
2023	55,861	27,914	5,691	2,447	1,700	771	4,919
2024	56,318	27,124	5,526	2,399	1,766	983	5,148
2025	54,461	26,895	5,467	2,327	1,760	795	4,883
Total	312,224	157,749	32,079	14,510	9,843	4,689	29,042

2.3 PORTFOLIO TARGETS BY YEAR

The following tables present the portfolio participation, savings, and costs targets by each program year.

TABLE 2-5 2020 PORTFOLIO TARGETS

	Portfolio Size	Total kWh Savings	Total MW (Demand)	Admin.	Implementation	Incentives	Total Budget
Residential							
Residential Lighting	239,866	8,088,914	905.24	\$101,000	\$186,419	\$463,014	\$750,433
Residential Prescriptive	7,966	2,465,148	691.22	\$40,400	\$347,608	\$632,065	\$1,020,073
Residential New Construction	86	188,624	121.46	\$5,050	\$50,000	\$16,775	\$71,825
Home Energy Assessment	300	519,393	55.48	\$5,050	\$240,000	-	\$245,050
Income Qualified Weatherization	539	778,285	443.32	\$20,200	\$1,275,176	-	\$1,295,376
Energy Efficient Schools	2,600	1,149,200	136.50	\$20,200	\$113,589	-	\$133,789
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$40,400	\$323,803	-	\$364,203
Appliance Recycling	1,251	1,179,811	171.20	\$40,400	\$143,657	\$61,000	\$245,057
CVR Residential	-	1,461,047	430	\$30,300	\$218,023	-	\$248,323
Smart Cycle (DLC Change Out)	1,000	-	1,015.00	\$20,200	\$516,000	\$96,000	\$632,200
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$20,200	\$22,280	\$52,280	\$94,760
Food Bank	-	-	-	-	-	-	-
Home Energy Management Systems	-	-	-	\$10,100	\$70,000	-	\$80,100
Residential Subtotal	302,908	22,879,629	5,783.70	\$353,500	\$3,506,555	\$1,321,134	\$5,181,189
Commercial & Industrial (C&I)							
Commercial Prescriptive	42,431	14,490,335	3,807.71	\$55,550	\$622,327	\$1,370,010	\$2,047,886
Commercial Custom	196	6,107,234	740.00	\$60,600	\$344,162	\$491,537	\$896,299
Small Business	381	2,940,932	213.00	\$5,050	\$215,618	\$548,167	\$768,835
CVR Commercial	-	1,032,656	214	\$30,300	\$148,233	-	\$178,533
Commercial & Industrial Subtotal	43,008	24,571,158	4,974.71	\$151,500	\$1,330,340	\$2,409,714	\$3,891,554
Indirect Costs							
Contact Center							\$63,000
Online Audit							\$42,911
Outreach							\$410,000
Portfolio Costs Subtotal							\$515,911
Subtotal (Before Evaluation)							\$9,588,653
Evaluation							\$490,728
DSM Portfolio Total							\$10,079,381
Other Costs							
Emerging Markets							\$200,000
Market Potential Study							-
Other Costs Subtotal							\$200,000
DSM Portfolio Total including Other Costs							\$10,279,381

Note: The team did not factor in the Energy Independence and Security Act (EISA) backstop provision until 2022. The team assumed that Vectren would continue to pilot the Home Energy Management Systems program through 2020.

TABLE 2-6 2021 PORTFOLIO TARGETS

	Participation	Total kWh Savings	Total kW Demand	Admin	Implementation	Incentives	Total Budget
Residential							
Residential Lighting	262,832	8,704,288	875.28	\$102,616	\$189,402	\$455,001	\$747,018
Residential Prescriptive	8,276	2,618,629	661.70	\$41,046	\$353,169	\$645,510	\$1,039,726
Residential New Construction	77	168,932	108.81	\$5,131	\$57,249	\$15,025	\$77,405
Home Energy Assessment	350	605,959	64.72	\$5,131	\$258,000	-	\$263,131
Income Qualified Weatherization	566	823,215	467.28	\$20,523	\$1,293,527	-	\$1,314,050
Energy Efficient Schools	2,600	1,149,200	136.50	\$20,523	\$117,253	-	\$137,776
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$20,523	\$328,984	-	\$349,507
Appliance Recycling	1,344	1,285,473	172.83	\$41,046	\$159,415	\$66,625	\$267,086
CVR Residential	-	-	-	\$30,785	\$197,378	-	\$228,163
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$20,523	\$536,000	\$116,000	\$672,523
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$20,523	\$30,280	\$60,280	\$111,083
Food Bank	6,312	1,564,332	172.21	\$20,523	\$92,517	-	\$113,041
Home Energy Management Systems	1,000	515,000	80.00	\$10,262	\$212,900	-	\$223,162
Residential Subtotal	333,657	24,682,235	5,568.60	\$359,156	\$3,826,074	\$1,358,441	\$5,543,671
Commercial & Industrial (C&I)							
Commercial Prescriptive	48,449	15,981,655	4,131.23	\$56,439	\$682,432	\$1,424,756	\$2,163,627
Commercial Custom	196	6,107,234	740.00	\$61,570	\$349,669	\$491,537	\$902,775
Small Business	382	2,944,615	213.00	\$5,131	\$219,172	\$539,573	\$763,876
CVR Commercial	-	-	-	\$30,785	\$133,547	-	\$164,332
Commercial & Industrial Subtotal	49,027	25,033,504	5,084.23	\$153,924	\$1,384,820	\$2,455,867	\$3,994,610
Indirect Costs							
Contact Center							\$64,008
Online Audit							\$43,598
Outreach							\$416,560
Portfolio Costs Subtotal							\$524,166
Subtotal (Before Evaluation)							\$10,062,446
Evaluation							\$522,653
DSM Portfolio Total							\$10,585,099
Other Costs							
Emerging Markets							\$200,000
Market Potential Study							\$300,000
Other Costs Subtotal							\$500,000
DSM Portfolio Total including Other Costs							\$11,085,099

Note: Participation and savings spike in 2021 due to: high Residential Prescriptive participation estimated by the Market Potential Study, the start of the Home Energy Management Systems program, the inclusion of the Food Bank program, and a final surge in participation in the Residential Lighting program estimated by the Market Potential Study.

TABLE 2-7 2022 PORTFOLIO TARGETS

	Participating Customers	Investment (\$/Customer)	Investment (\$/kW)	Annual Savings	Annual Costs	Annual Savings	Total Benefits
Residential							
Residential Lighting	91,708	3,259,915	255.83	\$104,258	\$144,380	\$346,846	\$595,484
Residential Prescriptive	8,303	2,722,283	737.22	\$41,703	\$358,820	\$680,160	\$1,080,683
Residential New Construction	75	164,892	106.37	\$5,213	\$53,186	\$14,675	\$73,074
Home Energy Assessment	420	727,151	77.67	\$5,213	\$263,225	-	\$268,438
Income Qualified Weatherization	594	869,076	492.09	\$20,852	\$1,312,171	-	\$1,333,023
Energy Efficient Schools	2,600	670,800	93.60	\$20,852	\$92,229	-	\$113,080
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$20,852	\$334,248	-	\$355,099
Appliance Recycling	1,425	1,360,636	184.89	\$41,703	\$171,385	\$70,500	\$283,589
CVR Residential	-	-	-	\$31,277	\$190,034	-	\$221,311
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$20,852	\$556,000	\$136,000	\$712,852
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$20,852	\$38,280	\$68,280	\$127,412
Food Bank	6,312	816,353	69.09	\$20,852	\$18,800	-	\$39,651
Home Energy Management Systems	1,000	515,000	80.00	\$10,426	\$219,900	-	\$230,326
Residential Subtotal	162,737	18,353,314	4,926.04	\$364,902	\$3,752,658	\$1,316,461	\$5,434,021
Commercial & Industrial (C&I)							
Commercial Prescriptive	52,971	17,154,963	4,383.05	\$57,342	\$733,558	\$1,448,274	\$2,239,173
Commercial Custom	196	6,107,234	740.00	\$62,555	\$355,263	\$491,537	\$909,355
Small Business	382	2,949,771	213.00	\$5,213	\$222,721	\$530,824	\$758,758
CVR Commercial	-	-	-	\$31,277	\$128,261	-	\$159,538
Commercial & Industrial Subtotal	53,549	26,211,968	5,336.05	\$156,387	\$1,439,803	\$2,470,635	\$4,066,825
Indirect Costs							
Contact Center							\$65,032
Online Audit							\$44,295
Outreach							\$423,225
Portfolio Costs Subtotal							\$532,552
Subtotal (Before Evaluation)							\$10,033,398
Evaluation							\$518,856
DSM Portfolio Total							\$10,552,254
Other Costs							
Emerging Markets							\$200,000
Market Potential Study							-
Other Costs Subtotal							\$200,000
DSM Portfolio Total including Other Costs							\$10,752,254

Note: Savings and participation are down in 2022 as the team assumed that the EISA backstop provision would remove downstream standard screw-in lighting incentives from all programs except for direct installations.

TABLE 2-8 2023 PORTFOLIO TARGETS

	Participate	Total kWh Savings	Total kW (Demand)	Admin.	Implementation	Incentives	Total Budget
Residential							
Residential Lighting	12,231	807,282	19.16	\$105,926	\$32,756	\$78,689	\$217,370
Residential Prescriptive	8,140	2,793,920	812.09	\$42,370	\$364,561	\$707,135	\$1,114,066
Residential New Construction	73	160,852	103.94	\$5,296	\$50,202	\$14,325	\$69,824
Home Energy Assessment	504	872,581	93.20	\$5,296	\$267,437	-	\$272,733
Income-Qualified Weatherization	623	917,290	518.75	\$21,185	\$1,331,114	-	\$1,352,299
Energy-Efficient Schools	2,600	670,800	93.60	\$21,185	\$98,274	-	\$119,460
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$21,185	\$339,596	-	\$360,781
Appliance Recycling	1,435	1,366,149	188.46	\$42,370	\$174,745	\$70,750	\$287,865
CVR Residential	-	1,461,047	430	\$31,778	\$270,252	-	\$302,029
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$21,185	\$576,000	\$156,000	\$753,185
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$21,185	\$46,280	\$76,280	\$143,745
Food Bank	3,156	649,158	46.71	\$21,185	\$9,550	-	\$30,735
Home Energy Management Systems	1,000	515,000	80.00	\$10,593	\$234,900	-	\$245,493
Residential Subtotal	80,062	17,461,286	5,215.19	\$370,741	\$3,795,666	\$1,103,179	\$5,269,586
Commercial & Industrial (C&I)							
Commercial Prescriptive	55,283	17,821,076	4,524.43	\$58,259	\$769,435	\$1,434,660	\$2,262,354
Commercial Custom	196	6,107,234	740.00	\$63,556	\$360,948	\$491,537	\$916,040
Small Business	382	2,952,715	213.00	\$5,296	\$226,003	\$521,287	\$752,586
CVR Commercial	-	1,032,656	214	\$31,778	\$184,861	-	\$216,639
Commercial & Industrial Subtotal	55,861	27,913,681	5,691.43	\$158,889	\$1,541,248	\$2,447,483	\$4,147,620
Indirect Costs							
Contact Center							\$66,073
Online Audit							\$45,004
Outreach							\$429,997
Portfolio Costs Subtotal							\$541,073
Subtotal (Before Evaluation)							\$9,958,279
Evaluation							\$512,192
DSM Portfolio Total							\$10,470,471
Other Costs							
Emerging Markets							\$200,000
Market Potential Study							-
Other Costs Subtotal							\$200,000
DSM Portfolio Total including Other Costs							\$10,670,471

Note: The team assumed that the EISA backstop provision would remove downstream specialty screw-in lighting incentives from all programs except for direct installations.

TABLE 2-9 2024 PORTFOLIO TARGETS

	Participants	Total kWh Savings	Total kW (Demand)	Actual	Implementation	Incentives	Total Budget
Residential							
Residential Lighting	14,089	977,297	19.66	\$107,621	\$38,416	\$92,287	\$238,324
Residential Prescriptive	7,892	2,860,501	889.35	\$43,048	\$370,394	\$732,410	\$1,145,582
Residential New Construction	71	156,812	101.51	\$5,381	\$48,144	\$13,975	\$67,500
Home Energy Assessment	504	840,768	89.03	\$5,381	\$271,716	-	\$277,097
Income-Qualified Weatherization	653	967,302	546.35	\$21,524	\$1,350,360	-	\$1,371,884
Energy-Efficient Schools	2,600	670,800	93.60	\$21,524	\$106,392	-	\$127,916
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$21,524	\$345,029	-	\$366,554
Appliance Recycling	1,372	1,300,910	183.54	\$43,048	\$168,946	\$67,325	\$279,320
CVR Residential	-	-	-	\$32,286	\$315,241	-	\$347,528
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$21,524	\$596,000	\$176,000	\$793,524
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$21,524	\$54,280	\$84,280	\$160,084
Food Bank	3,156	649,158	46.71	\$21,524	\$9,703	-	\$31,227
Home Energy Management Systems	1,000	515,000	80.00	\$10,762	\$245,940	-	\$256,702
Residential Subtotal	81,637	16,185,755	4,879.02	\$376,673	\$3,920,561	\$1,166,277	\$5,463,511
Commercial & Industrial (C&I)							
Commercial Prescriptive	55,739	18,058,503	4,572.95	\$59,191	\$791,792	\$1,394,674	\$2,245,657
Commercial Custom	196	6,107,234	740.00	\$64,572	\$366,723	\$491,537	\$922,832
Small Business	383	2,957,870	213.00	\$5,381	\$229,663	\$512,537	\$747,582
CVR Commercial	-	-	-	\$32,286	\$216,561	-	\$248,848
Commercial & Industrial Subtotal	56,318	27,123,608	5,525.95	\$161,431	\$1,604,739	\$2,398,748	\$4,164,919
Indirect Costs							
Contact Center							\$67,130
Online Audit							\$45,724
Outreach							\$436,877
Portfolio Costs Subtotal							\$549,730
Subtotal (Before Evaluation)							\$10,178,160
Evaluation							\$520,077
DSM Portfolio Total							\$10,698,237
Other Costs							
Emerging Markets							\$200,000
Market Potential Study							\$300,000
Other Costs Subtotal							\$500,000
DSM Portfolio Total including Other Costs							\$11,198,237

Note: The team assumed that lighting direct installations would decrease from the previous year due to EISA.

TABLE 2-10 2025 PORTFOLIO TARGETS

	Portfolio	Total kWh Savings	Total kWh (Percentage)	Admin	Implementation	Indirects	Total Budget
Residential							
Residential Lighting	15,913	1,146,410	274.12	\$109,343	\$44,005	\$105,714	\$259,061
Residential Prescriptive	8,136	2,974,980	961.29	\$43,737	\$376,320	\$767,435	\$1,187,492
Residential New Construction	70	154,792	100.29	\$5,467	\$46,909	\$13,800	\$66,176
Home Energy Assessment	504	790,845	83.15	\$5,467	\$276,063	-	\$281,530
Income-Qualified Weatherization	685	1,018,544	575.34	\$21,869	\$1,369,913	-	\$1,391,782
Energy-Efficient Schools	2,600	670,800	93.60	\$21,869	\$117,023	-	\$138,891
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$21,869	\$350,550	-	\$372,418
Appliance Recycling	1,253	1,180,913	171.99	\$43,737	\$155,651	\$61,050	\$260,438
CVR Residential	-	-	-	\$32,803	\$282,073	-	\$314,876
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$21,869	\$616,000	\$196,000	\$833,869
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$21,869	\$62,280	\$92,280	\$176,429
Food Bank	3,156	649,158	46.71	\$21,869	\$9,858	-	\$31,727
Home Energy Management Systems	1,000	515,000	80.00	\$10,934	\$266,980	-	\$277,914
Residential Subtotal	83,617	16,348,650	5,215.76	\$382,700	\$3,973,626	\$1,236,279	\$5,592,604
Commercial & Industrial (C&I)							
Commercial Prescriptive	53,882	17,825,085	4,513.77	\$60,139	\$797,128	\$1,331,794	\$2,189,060
Commercial Custom	196	6,107,234	740.00	\$65,606	\$372,590	\$491,537	\$929,733
Small Business	383	2,963,026	213.00	\$5,467	\$233,383	\$503,787	\$742,637
CVR Commercial	-	-	-	\$32,803	\$193,019	-	\$225,821
Commercial & Industrial Subtotal	54,461	26,895,345	5,466.77	\$164,014	\$1,596,120	\$2,327,118	\$4,087,252
Indirect Costs							
Contact Center							\$68,204
Online Audit							\$46,456
Outreach							\$443,867
Portfolio Costs Subtotal							\$558,526
Subtotal (Before Evaluation)							\$10,238,382
Evaluation							\$520,203
DSM Portfolio Total							\$10,758,585
Other Costs							
Emerging Markets							\$200,000
Market Potential Study							-
Other Costs Subtotal							\$200,000
DSM Portfolio Total including Other Costs							\$10,958,585

Note: The team assumed that lighting direct installations would decrease from the previous year due to EISA.

Program Concepts

This section provides an overview of each program, organized by the following topic areas: 1) Background, 2) Relationship to Vectren's Market Potential Study, 3) Methods and Associated Risks, and 4) Technology and Program Data.

3.1 RESIDENTIAL LIGHTING

3.1.1 Background

The Residential Lighting Program remains an upstream program designed to reach Vectren customers through retail outlets. The program is aimed at encouraging Vectren customers to install more energy-efficient bulbs in their homes. The program consists of a buy-down strategy at the point of purchase, so it is seamless to the participant. Any customer of a participating retailer in Vectren South's electric territory is eligible for the program.

Vectren will oversee the program and work with a partner organization on delivery. The implementation contractor will verify the paperwork of the participating retail stores and spot check stores to assure that the program guidelines are being followed.

The measures will include a variety of ENERGY STAR-qualified lighting products currently available at retailers in Indiana including:

- Standard units
- Specialty units
- LED fixtures
- Exterior lighting controls

3.1.2 Relationship to Vectren's Market Potential Study

The team cross-referenced measures from the Market Potential Study with measures included in the Residential Lighting Program. As measures from the Residential Lighting Program also appear in other Vectren residential programs, the team also compared the rate of sales in other programs to the Residential Lighting Program. From this analysis, the team estimated that measures from the Residential Lighting Program have market potential well above Action Plan participation estimates.

3.1.3 Program Considerations

The program, as designed, takes the Energy Independence and Security Act (EISA) policies into account. A backstop efficiency ruling is slated to take effect in 2020 and will shift the baseline efficiency of most screw-in LED bulbs from halogens to CFLs. Though there is speculation about the timeline and likelihood of this regulation taking effect, the team conservatively assumed the EISA backstop for standard LED bulbs would take effect in 2020 and the EISA backstop for specialty bulbs would take effect in 2021. The team also assumed that non-compliant products would still be sold for up to one year after the regulations take effect, as suggested by the Uniform Methods Project.⁴¹ Therefore, the Residential Lighting Program will discontinue standard LED incentives beginning in 2022 and for specialty lighting products in 2023.

3.1.4 Technology and Program Data

The following table provides summary of the Residential Lighting Program energy impacts and budget.

⁴¹ <https://www.nrel.gov/docs/fy18osti/70472.pdf>

TABLE 3-1 RESIDENTIAL LIGHTING – IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Participants	239,866	262,832	91,708	12,231	14,089	15,913
Energy Savings (kWh)	8,088,914	8,704,288	3,259,915	807,282	977,297	1,146,410
Summer Peak Demand Savings (kW)	905	875	256	19	20	274
Total Program Budget	\$750,433	\$747,018	\$595,484	\$217,370	\$238,324	\$259,061
Per Participant Energy Savings (kWh)	34	33	36	66	69	72
Per Participant Demand Savings (kW)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Per Participant Average Incentive	\$2	\$2	\$4	\$6	\$7	\$7
Weighted Average Measure Life	15	15	14	9	9	9
Incremental Technology Cost	\$4	\$4	\$6	\$26	\$26	\$26
Net-to-Gross Ratio	84%	79%	76%	84%	84%	84%

Note: Number of participants, energy savings, and demand savings estimates based primarily on Market Potential Study results. Program budget estimate based on current schedule of work and projected rising costs from Vectren Program Cost and Measure Data spreadsheet. Per unit savings estimates based on the Market Potential Study results. Per participant energy savings, per participant demand savings, and incremental technology cost weighted by participant. Weighted average measure life and net to gross ratio weighted by kWh.

3.2 RESIDENTIAL PRESCRIPTIVE

3.2.1 Background

The Residential Prescriptive Program is designed to incent customers to purchase energy efficient equipment by covering part of the incremental cost. The program also offers home weatherization rebates to residential customers for attic and wall insulation. If a product vendor or contractor chooses to do so, they can present rebates as an “instant discount” to Vectren’s residential customers on their invoice. Vectren will oversee the program and work with an implementation partner on delivery.

Any residential customer located in the Vectren South electric service territory is eligible to participate in the program. For the equipment rebates, the applicant must reside in a single-family home or multi-family complex with up to 12 units. Only single-family homes are eligible for insulation measures.

Measures included in the program will change over time as baselines change, new technologies become available, and customer needs are identified. Measures include:

- ASHP Tune Ups
- Air Purifiers
- Air Source Heat Pumps
- Attic Insulation
- Central Air Conditioners
- Duct Sealing
- Ductless Heat Pumps
- Dual Fuel Air Source Heat Pumps
- ENERGY STAR Electric Clothes Washers (new in 2020)
- ENERGY STAR Dehumidifiers, Electric Clothes Dryers and Room Air Conditioners (new in 2020)
- Heat Pump Water Heaters

- Nest On-Line Store Thermostats
- Wi-Fi Thermostats
- Smart/CEE Tier3 Clothes Washers (new in 2020)
- Smart Programmable Thermostats
- Variable Speed Pool Pumps
- Wall Insulation
- Air Conditioning Tune Ups

5.2.3 Relation to Vectren's Market Potential Study

The team cross-referenced measures from the Market Potential Study with measures included in the existing Residential Prescriptive Program. As measures from the Residential Prescriptive Program also appear in other Vectren residential programs, the team also compared the rate of sales in other programs to the Residential Prescriptive Program. From this analysis, the team found that several Residential Prescriptive Program measures had already reached the full RAP estimated in the Market Potential Study (such as attic insulation), and the team capped future participation at the rates estimated by the potential study.

5.2.4 Program Considerations

A major change to the electric Residential Prescriptive program is the removal of the ECM HVAC motor and pool heaters measure due to changes in standards, low NTG, and low benefit-cost testing.

There are many measures are new to the program, including: dehumidifiers, clothes washers, clothes dryers, room air conditioners, water heaters, and tankless water heaters. The team provided escalating estimates for participation for these measures over the duration of the Action Plan.

5.2.4 Technology and Program Data

The following table provides summary of the Residential Prescriptive Program energy impacts and budget.

TABLE 3-2 RESIDENTIAL PRESCRIPTIVE – IMPACTS AND BUDGET (ELECTRIC)

	2019	2020	2021	2022	2023	2024
Number of Participants	7,966	8,276	8,303	8,140	7,892	8,136
Energy Savings kWh	2,465,148	2,618,629	2,722,283	2,793,920	2,860,501	2,974,980
Peak Demand kW	691	662	737	812	889	961
Total Program Budget	\$1,020,073	\$1,039,726	\$1,080,683	\$1,114,066	\$1,145,852	\$1,187,492
Per Participant Energy Savings (kWh)	309	316	328	343	362	366
Per Participant Demand Savings (kW)	0.09	0.08	0.09	0.10	0.11	0.12
Per Participant Average Incentive	\$79	\$78	\$82	\$87	\$93	\$94
Weighted Average Measure Life	13	13	14	14	14	14
Incremental Technology Cost	\$148	\$146	\$160	\$174	\$191	\$199
Net-to-Gross Ratio	50%	51%	51%	52%	53%	53%

Note: Number of participants, energy savings, and demand savings estimates based primarily on Market Potential Study results. Program budget estimate based on current schedule of work and projected rising costs from Vectren Program Cost and Measure Data spreadsheet. Per unit savings estimates based on the Market Potential Study results. Per participant energy savings, per participant demand savings, and incremental technology cost weighted by participant. Weighted average measure life and net to gross ratio weighted by kWh.

3.3 RESIDENTIAL NEW CONSTRUCTION

3.3.1 Background

The Residential New Construction (RNC) program will produce long-term electric and gas savings by encouraging the construction of single-family homes, duplexes, or end-unit townhomes with only one shared wall that are inspected and evaluated through the Home Efficiency Rating System (HERS). Two incentive levels have been defined by the HERS Index score the house achieves. As of 2018, Gold Star homes must achieve a HERS rating of 61 to 63. Platinum Star homes must meet a HERS rating of 60 or less.

Any customer or home builder constructing a home and meeting the program specifications in the Vectren South electric service territory is eligible to participate in the program. Program incentives are designed to be paid to both all-electric and combination homes that have natural gas heating and water heating. It is important to note that the program is structured such that an incentive will not be paid for an all-electric home that has natural gas available to the home site. Incentives can be paid to either the home builder or the customer/account holder. Incentives are based on the rating tier qualification. As part of the Quality Assurance/Quality Control process, the HERS Assessment is completed by a certified third party HERS Rater. As part of the Quality Assurance/Quality Control process, the vendor provided 100% paper verification that the equipment/products purchased meet the program efficiency standards.

3.3.2 Relation to Vectren's Market Potential Study

The Market Potential Study indicated that the market for the Residential New Construction Program is shrinking in Vectren South and is expanding in Vectren North. The team used previous program participation to calibrate rates from the Market Potential Study.

3.3.3 Program Considerations

The housing market is sensitive to market conditions and unforeseen economic circumstances may impact this program in the future.

3.3.4 Technology and Program Data

The following table provides summary of the Residential New Construction Program energy impacts and budget.

TABLE 3-3 RESIDENTIAL NEW CONSTRUCTION – IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Homes	86	77	75	73	71	70
Energy Savings kWh	188,624	168,932	164,892	160,852	156,812	154,792
Peak Demand kW	121	109	106	104	102	100
Total Program Budget	\$71,825	\$77,405	\$73,074	\$69,824	\$67,500	\$66,176
Per Participant Energy Savings (kWh)	2,193	2,194	2,199	2,203	2,209	2,211
Per Participant Demand Savings (kW)	1.41	1.41	1.42	1.42	1.43	1.43
Per Participant Average Incentive	\$195	\$195	\$196	\$196	\$197	\$197
Weighted Average Measure Life	25	25	25	25	25	25
Incremental Technology Cost	\$2,352	\$2,353	\$2,361	\$2,370	\$2,379	\$2,384
Net-to-Gross Ratio	50%	50%	50%	50%	50%	50%

Note: Participant and energy savings estimates based primarily on Market Potential Study results. Program budget estimate based on current schedule of work and projected rising costs from Vectren Program Cost and Measure Data spreadsheet. Per

2021	2022	2023	2024	2025
<i>unit savings estimates based on the Market Potential Study results. Per participant energy savings, per participant demand savings, and incremental technology cost weighted by participant. Weighted average measure life and net to gross ratio weighted by kWh.</i>				

3.4 HOME ENERGY ASSESSMENT

3.4.1 Background

The Home Energy Assessment (HEA) Program is offered jointly by Vectren South Gas and Electric. This program provides customers with an on-site energy assessment, providing direct installation of energy-efficient measures including high efficiency water fixtures, LED bulbs and smart thermostats. Assessors will perform a walk-through assessment of the home, collecting data for use in identifying cost-effective energy-efficient improvements and appropriate direct install measures. Assessors will then provide an audit report to the customer while assessors are onsite to outline other retrofit opportunities within the home.

Vectren South residential customers with electric service at a single-family residence, provided the home was not built within the past five years and has not had an audit within the last three years, are eligible to participate in the program. Additionally, the home should either be owner-occupied or, if renter-occupied, where occupants have the electric service in their name.

The direct install measures available for installation at no cost include:

- Audit & Education
- Kitchen & Bathroom Aerators
- Filter Whistle
- LED bulbs
- High efficiency Showerhead
- Pipe Wrap
- Water Heater Temperature Setback
- Smart Thermostat

3.4.2 Relation to Vectren's Electric Potential Study

The team cross-referenced measures from the Market Potential Study with measures included in the Home Energy Assessment Program. As measures from the Home Energy Assessment program also appear in other Vectren residential programs, the team also compared the rate of sales in other programs to the Home Energy Assessment Program. From this analysis, the team estimated that measures from the Home Energy Assessment Program have market potential well above Action Plan participation estimates.

3.4.3 Program Considerations

The impact of the EISA backstop was considered in the inclusion of LED bulbs in the Home Energy Assessment program and affects the program beginning in 2024. Because of the direct install nature of the program, it was assumed that inefficient lighting will continue to be present in customer homes throughout the timeframe of the Action Plan. Thus, inefficient lighting found in customer homes would be eligible for replacement, though fewer inefficient bulbs would be found in customer homes after 2023.

3.4.4 Technology and Program Data

The following table provides summary of the Home Energy Assessment Program energy impacts and budget.

TABLE 3-4 HOME ENERGY ASSESSMENT – IMPACTS AND BUDGET

	2018	2019	2020	2025	2034	2038
Number of Participants	300	350	420	504	504	504
Energy Savings kWh	519,393	605,959	727,151	872,581	840,768	790,845
Peak Demand kW	55	65	78	93	89	83
Total Program Budget	\$245,050	\$263,131	\$268,438	\$272,733	\$277,097	\$281,530
Per Participant Energy Savings (kWh)	1,731	1,731	1,731	1,731	1,668	1,569
Per Participant Demand Savings (kW)	0.18	0.18	0.18	0.18	0.18	0.16
Weighted Average Measure Life	13	13	13	13	13	13
Net-to-Gross Ratio	101%	101%	101%	101%	101%	101%

Note: Number of participants estimated based on interview with the current program implementer, JE Shekell. Per unit savings estimated based on 2018 Operating Plan. Program costs estimated based on current SOW and projected rising costs described by JE Shekell. Kwh and kw savings estimated by dividing total savings by total participants. Incremental technology cost estimated by summing the incremental cost of each piece of equipment and divided by number of participants. Weighted average measure life and net to gross ratio weighted by kWh.

3.5 INCOME-QUALIFIED WEATHERIZATION

3.5.1 Background

The Income-Qualified Weatherization Program (IQW) is designed to provide direct install measures and weatherization upgrades to low-income homes that otherwise would not have been able to afford the energy saving measures. The program provides direct installation of energy-saving measures and educates consumers on ways to reduce energy consumption. Eligible customers will have opportunity to receive deeper retrofit measures including refrigerators, attic insulation, duct sealing, and air infiltration reduction. Vectren will oversee the program and partner with an implementation contractor to deliver the program. A list of high consumption customers who have received Energy Assistance Program (EAP) funds within the past 12 months will be used to help prioritize those customers. In addition to utilizing the EAP List, implementers will utilize census data to target low-income areas within Vectren territory. In future years, the IQW program will shift focus to providing a more quality and in-depth approach. The focus will be to provide deeper retrofit measures where needed to fewer participants, thus reaping greater savings and benefits to the customer.

Collaboration and coordination between gas and electric low-income programs along with state and federal funding is recommended to provide the greatest efficiencies among all programs. The challenge of meeting the goals set for this program have centered on health and safety as well as customer cancellations and scheduling. Vectren is committed to finding innovative solutions to these areas. A health and safety (H&S) budget has been established and we continue to work on improving methods of customer engagement with various confirmations via phone and email reminders prior to the appointment. Vectren will look for ways to do more of a qualitative approach within this program to ensure the maximum savings is reached and H&S issues are addressed appropriately.

Measures available for installation will vary based on the home and include:

- LED bulbs/lamps (interior/exterior)
- High Efficiency Showerheads (Standard or Handheld)
- High efficiency faucet aerators
- Filter whistles
- Infiltration reduction
- Attic insulation

- Duct repair, seal and insulation
- Refrigerator replacement
- Smart thermostats
- Water Heater Temperature Setback

3.5.2 Relation to Vectren's Market Potential Study

The team cross-referenced measures from the Market Potential Study with measures included in IQW. As measures from IQW also appear in other Vectren residential programs, the team also compared the rate of sales in other programs to IQW. From this analysis, the team estimated that measures from IQW have market potential well above Action Plan participation estimates.

3.5.3 Program Considerations

Measures for the Income-Qualified Weatherization Program do not need to be cost-effective at the program level and therefore the Market Potential Study did not screen measures based on a cost-effectiveness test. The team chose measures that they felt would provide the most value to customers. The team chose a “quality over quantity” approach and provided more services to each individual customer than in previous program years. To ensure that the program did not overwhelm other energy efficiency program priorities, the team ensured that the overall program budget did not vastly exceed previous program budgets. The team dropped smart power strips from the program as they had a very low cost-effectiveness score and seemed to provide less value than other measures.

The impact of the EISA backstop was considered in the inclusion of income-qualified LED bulbs in the program beginning in 2024. It was assumed that inefficient lighting will continue to be present in customer homes throughout the timeframe of the Action Plan. Thus, inefficient lighting found in customer homes would be eligible for replacement, though fewer inefficient bulbs would be found in customer homes after 2023.

3.5.4 Technology and Program Data

The following table provides summary of IQW energy impacts and budget.

TABLE 3-5 INCOME-QUALIFIED WEATHERIZATION – IMPACTS AND BUDGET

	2023	2024	2025	2026	2027	2028
Number of Participants	539	566	594	623	653	685
Energy Savings kWh	778,285	823,215	869,076	917,290	967,302	1,018,544
Peak Demand kW	443	467	492	519	546	575
Total Program Budget	\$1,295,376	\$1,314,050	\$1,333,023	\$1,352,299	\$1,371,884	\$1,391,782
Per Participant Energy Savings (kWh)	1,444	1,454	1,463	1,472	1,481	1,487
Per Participant Demand Savings (kW)	0.82	0.83	0.83	0.83	0.84	0.84
Weighted Average Measure Life	16	16	16	16	16	16
Incremental Technology Cost	\$809	\$822	\$833	\$850	\$867	\$880
Net-to-Gross Ratio	100%	100%	100%	100%	100%	100%

Note: Energy savings, and demand savings estimates primarily based on the Market Potential Study results and 2018 Operating Plan estimates and projected rising costs from 2018-20 filed Energy Efficiency Plan and Vectren Program Cost and Measure Data spreadsheet. Number of participants based on historical program participation. Per participant energy and demand savings calculated by dividing total savings by participation. Weighted average measure life and net to gross weighted by kWh. Incremental cost calculated by summing the incremental cost of each piece of equipment and divided by number of participants.

3.6 ENERGY-EFFICIENT SCHOOLS

3.6.1 Background

The Energy-Efficient Schools Program is designed to produce cost-effective electric and gas savings by educating students and their families about conservation and the efficient use of electricity. The program consists of a school education program for fifth grade students attending schools served by Vectren South. To help in this effort, each child that participates will receive a take-home energy kit with various energy-saving measures for their parents to install in the home. The kits, along with the in-school teaching materials, are designed to make a lasting impression on the students and help them learn ways to conserve energy. Selected fifth grade students/schools in the Vectren South electric service territory are eligible for the program.

The kits for students will include:

- High efficiency showerheads
- High efficiency kitchen aerators
- High efficiency bathroom aerators
- LED bulbs
- LED nightlights
- Filter whistles

3.6.2 Relation to Vectren's Electric Potential Study

Though the Market Potential Study estimated savings, only customers with enrolled fifth grade students will participate in the program. As such, the Market Potential Study did not serve as a useful estimate for future Energy-Efficient Schools Program participation. The team relied on previous participation and discussions with the implementer to arrive at useful estimates.

3.6.3 Program Constraints

The team assumed that previous participation is a good indicator of future participation and, in consultation with the implementer, assumed that the program had a little room to grow from the 2018-2020 filed Energy Efficiency plan. The Energy-Efficient Schools Program will discontinue standard LED incentives beginning in 2022 to account for the EISA backstop.

3.6.4 Technology and Program Data

The following table provides summary of the Energy-Efficient Schools Program energy impacts and budget.

TABLE 3-6 ENERGY-EFFICIENT SCHOOLS – IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Participants	2,600	2,600	2,600	2,600	2,600	2,600
Energy Savings kWh	1,149,200	1,149,200	670,800	670,800	670,800	670,800
Peak Demand kW	137	137	94	94	94	94
Total Program Budget	\$133,789	\$137,776	\$113,080	\$119,460	\$127,916	\$138,891
Per Participant Demand Savings (kWh)	442	442	258	258	258	258
Per Participant Demand Savings (kW)	0.05	0.05	0.04	0.04	0.04	0.04
Weighted Average Measure Life	12	12	10	10	10	10

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	2018	2019	2020	2023	2024	2025
Net-to-Gross Ratio	100%	100%	100%	100%	100%	100%

Note: Number of participants, energy savings, and demand savings estimates primarily based on the 2018-20 filed Energy Efficiency Plan, and the 2018 Operating Plan. Program costs primarily based on current SOW and projected rising costs from 2018-20 filed Energy Efficiency Plan and Vectren Program Cost and Measure Data spreadsheet. Per participant energy savings and demand savings calculated by dividing total savings by total participation. Weighted measure life and net to gross ratio are weighted by kWh.

3.7 RESIDENTIAL BEHAVIOR SAVINGS

3.7.1 Background

The Residential Behavioral Savings Program (RBS) motivates behavior change and provides relevant, targeted information to the consumer through regularly scheduled, direct contact via mailed and emailed home energy reports. The measures for this program consist of a Home Energy Report and web portal, which anonymously compares customers' energy use with that of other customers with similar-sized home and demographics, usage history comparisons, goal setting tools, and progress trackers. Customers can view the past twelve months of their energy usage and compare and contrast their energy consumption and costs with others in the same neighborhood. The logic for the program is that once a consumer understands better how they use energy, they can then start conserving energy. Residential customers who receive electric service from Vectren South are eligible for this integrated natural gas and electric EE program.

The program will be delivered by an implementation vendor and include energy reports and a web portal. Customers typically receive between 4-6 reports annually. Additionally, customers receive monthly emails. These reports provide updates on energy consumption patterns compared to similar homes and provide energy savings strategies to reduce energy use. These reports can also promote other Vectren programs to interested customers. The web portal is an interactive system for customers to perform a self-audit, monitor energy usage over time, access energy saving tips, and be connected to other Vectren South gas and electric programs. A third-party evaluator will complete the evaluation of this program.

In 2021, Vectren plans on introducing a new targeted income cohort of participants into the program. Vectren will work with the implementation contractor and the third-party evaluator to determine a participant and non-participant group for this new cohort.

3.7.2 Relation to Vectren's Market Potential Study

The team assumed that restrictions stipulated within the current RBS implementation contract would continue through the timeframe of the Action Plan. As specified by the contract, Vectren can increase the number of treatment customers to the original contracted amount (49,000). The team ensured that this 49,000-participant estimate was below the estimate provided by the Market Potential Study.

3.7.3 Program Considerations

The team assumed that past program performance is a reasonable indicator of future performance. As the third-party evaluator estimates savings for RBS using a billing analysis, the savings resulting from the program may shift from year to year, depending on the behavior of the program participants in any given year. The program also faces the risk of customers losing interest in the program and no longer attempting to curb their energy usage.

3.7.4 Technology and Program Data

The following table provides summary of RBS energy impacts and budget.

TABLE 3-7 RESIDENTIAL BEHAVIOR SAVINGS – IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Participants	49,000	49,000	49,000	49,000	49,000	49,000
Energy Savings kWh	7,049,208	7,049,208	7,049,208	7,049,208	7,049,208	7,049,208
Peak Demand kW	1,574	1,574	1,574	1,574	1,574	1,574
Total Program Budget	\$364,203	\$349,507	\$355,099	\$360,781	\$366,554	\$372,418
Per Participant Energy Savings (kWh)	144	144	144	144	144	144
Per Participant Demand Savings (kW)	0.03	0.03	0.03	0.03	0.03	0.03
Weighted Average Measure Life	1	1	1	1	1	1
Net-to-Gross Ratio	100%	100%	100%	100%	100%	100%

Note: Number of participants, energy savings, and demand savings estimates primarily based on the 2018-20 filed Energy Efficiency Plan, and the 2018 Operating Plan. Program costs primarily based on current SOW and projected rising costs from 2018-20 filed Energy Efficiency Plan and Vectren Program Cost and Measure Data spreadsheet. Per participant energy savings and demand savings calculated by dividing total savings by total participation. Weighted measure life and net to gross ratio are weighted by kWh.

3.8 APPLIANCE RECYCLING

3.8.1 Background

The Residential Appliance Recycling Program encourages customers to recycle their old inefficient refrigerators, freezers, and air conditioners in an environmentally safe manner. The program recycles these appliances so that they no longer use electricity and it keeps 95% of the appliance out of landfills.

Any residential customer with an operable secondary refrigerator, freezer, or air conditioner unit receiving electric service from Vectren South is eligible to participate in the program.

Vectren works directly with an implementer to administer this program. Recycled units are logged and tracked to assure proper handling and disposal. The utility monitors the activity for disposal. Customer satisfaction surveys are also used to understand the customer experience with the program.

Measures include:

- Refrigerator recycling
- Freezer recycling
- Room air conditioner recycling (new in 2020)

3.8.2 Relation to Vectren's Market Potential Study

The team cross-referenced measures from the Market Potential Study with measures included in the Appliance Recycling Program. From this analysis, the team estimated that measures from the Appliance Recycling Program have market potential well above Action Plan participation estimates.

3.8.3 Program Considerations

After reviewing the results of the Market Potential Study and conducting an interview with the current program implementer, the team decided to add room air conditioner recycling to the program. Based on the Market Potential Study, the team also projected growth in the Appliance Recycling Program in the region over the span of the Action Plan.

3.8.4 Technology and Program Data

The following table provides summary of the Appliance Recycling Program energy impacts and budget.

TABLE 3-8 APPLIANCE RECYCLING – IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Participants	1,251	1,344	1,425	1,435	1,372	1,253
Energy Savings kWh	1,179,811	1,285,473	1,360,636	1,366,149	1,300,910	1,180,913
Peak Demand kW	171	173	185	188	184	172
Total Program Budget	\$245,057	\$267,086	\$283,589	\$287,865	\$279,320	\$260,438
Per Participant Energy Savings (kWh)	943	956	955	952	948	942
Per Participant Demand Savings (kW)	0.14	0.13	0.13	0.13	0.13	0.14
Per Participant Average Incentive	\$49	\$50	\$49	\$49	\$49	\$49
Weighted Average Measure Life	8	8	8	8	8	8
Net-to-Gross Ratio	71%	71%	71%	71%	71%	71%

Note: Number of participants, energy savings, and demand savings estimated primarily based on the Market Potential Study and 2018 Operating Plan. Program costs estimated using the Market Potential Study, the current SOW, and projected rising costs from 2018-20 filed Energy Efficiency Plan and Program Cost and Participant Data spreadsheet. Per unit savings estimated based on 2018 Operating Plan. weighted average measure life and net to gross ratio weighted by kWh. Per participant incentive and incremental technology cost weighted by participant.

3.9 FOOD BANK

3.9.1 Background

The Food Bank Program provides LED bulbs and high efficiency showerheads to food pantries in Vectren South's electric service territory. This program targets hard-to-reach, low-income customers in the Vectren South electric territory. All food pantry recipients must provide proof of income qualification to receive the food baskets.

Each participating food pantry will place a bundle of four LED bulbs and a single high efficiency showerhead in food packages. The program implementer purchases equipment from a manufacturer and the equipment is shipped in bulk to the partner food bank. Food banks then distribute the equipment to the respective food pantries in its network. Pantries include equipment when assembling food packages and equipment is provided to food recipients. Any customer visiting a food pantry in Vectren South's electric territory is eligible to participate in the program.

Measures include:

- LED bulbs
- High efficiency showerheads (new in 2021)

3.9.2 Relation to Vectren's Market Potential Study

Though the Market Potential Study estimated savings resulting from income-qualified measures, only a small portion of income-qualified customers will become food pantry recipients. As such, the Market Potential Study did not serve as a useful estimate for future Food Bank Program participation.

3.9.3 Program Considerations

Vectren expressed interest in continuing a Food Bank program after the EISA backstop was implemented. The team examined possible new measures and determined that showerheads could provide significant energy savings for food pantry recipients. The team used savings values from other income-qualified programs as a proxy for savings from the Food Bank Program.

3.9.4 Technology and Program Data

The following table provides summary of the Food Bank Program energy impacts and budget.

TABLE 3-9 FOOD BANK – IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Participants	-	6,312	6,312	3,156	3,156	3,156
Energy Savings kWh	-	1,564,332	816,353	649,158	649,158	649,158
Peak Demand kW	-	172	69	47	47	47
Total Program Budget	-	\$113,041	\$39,651	\$30,735	\$31,227	\$31,727
Per Participant Energy Savings (kWh)	-	248	129	206	206	206
Per Participant Demand Savings (kW)	-	0.03	0.01	0.01	0.01	0.01
Weighted Average Measure Life	-	11	11	7	5	5
Net-to-Gross Ratio	-	100%	100%	100%	100%	100%

Note: Number of participants, energy savings, and demand savings estimated based on 2018 Operating Plan. Program costs estimated based on current SOW, projected rising costs from 2018-20 filed Energy Efficiency Plan, and Vectren Program Cost and Measure Data spreadsheet. Per unit energy savings and per unit demand savings calculated by dividing total savings by the total number of participants. Weighted average measure life and net to gross ratio weighted by kWh. Incremental technology cost calculated by summing the incremental cost of each piece of equipment and dividing by the total number of participants.

3.10 HOME ENERGY MANAGEMENT SYSTEMS

3.10.1 Background

The Home Energy Management Systems (HEMS) program is a behavioral program that provides real time energy usage data to encourage customers to take action to reduce energy consumption. The objectives of this program include:

- Motivate customers to save energy by increasing customer awareness and engagement around energy consumption and their utility bill
- Increase customer knowledge of and participation in Company programs including, but not limited to, energy efficiency programs and advanced data analytics
- Deliver energy and demand savings

The HEMS program will be piloted using advanced metering infrastructure (AMI) data to communicate energy usage to customers. The platform will utilize a smart phone application to communicate with customers about their home energy usage and provide suggestions for ways customers can save energy. To enhance customer engagement, participants in the program will receive a smart thermostat at no cost, if they do not currently have one installed in their home. Pending EM&V Report results, the program will potentially be rolled out to additional participants.

Given a successful pilot and positive EM&V Report results of the HEMS program, Vectren plans to scale the program to include additional features. The additional features would allow customers to install a device that provides real-time home energy usage data.

All Vectren South electric customers are eligible to participate in this program.

3.10.2 Relation to Vectren's Market Potential Study

The Market Potential Study provided estimates on various smart home technologies including home energy management systems. The program model is very specific and initially only relies on a phone application, the energy management systems estimate in the Market Potential Study may not accurately reflect the total market size available to the Home Energy Management Systems Program.

The team relied on savings estimates from the implementation contractor. The team compared estimates provided by the implementation contractor to the estimated savings presented in the Market Potential Study and found that the implementation contractor estimates were well within the bounds of the Market Potential Study estimates.

3.10.3 Program Considerations

The team utilized savings estimates provided by a HEMS vendor as well as publicly available evaluation documents of home energy management systems. The vendor indicated that they had evaluation-verified savings estimates, although the evaluation results were not currently public. The team acknowledges that savings estimates provided by the implementing contractor are susceptible to bias and, thus, chose a conservative estimate to provide counterbalance.

3.10.4 Technology and Program Data

The following table provides summary of the Home Energy Management Systems Program energy impacts and budget.

TABLE 3-10 HOME ENERGY MANAGEMENT SYSTEMS – IMPACTS AND BUDGET

	2019	2021	2023	2025	2027	2028
Number of Participants	-	1,000	1,000	1,000	1,000	1,000
Energy Savings kWh	-	515,000	515,000	515,000	515,000	515,000
Peak Demand kW	-	80	80	80	80	80
Total Program Budget	\$80,100	\$223,162	\$230,326	\$245,493	\$256,702	\$277,914
Per Participant Energy Savings (kWh)	-	515	515	515	515	515
Per Participant Demand Savings (kW)	-	0.08	0.08	0.08	0.08	0.08
Weighted Average Measure Life	-	6	6	6	6	6
Net-to-Gross Ratio	-	100%	100%	100%	100%	100%

Note: Number of participants, energy savings, demand savings, and program costs estimated based on interviews with the implementer. The team assumed the same weighted average measure life as the current behavioral program. The net to gross ratio is weighted by kWh.

The following table provides summary of the cumulative participants in the Home Energy Management Systems Program over the course of the Action Plan.

TABLE 3-10 HOME ENERGY MANAGEMENT SYSTEMS – PARTICIPANTS AND CUMULATIVE PARTICIPANTS

	2020	2021	2022	2023	2024	2025
Number of Participants	-	1,000	1,000	1,000	1,000	1,000
Cumulative Number of Participants	-	1,000	2,000	3,000	4,000	5,000

3.11 BRING YOUR OWN THERMOSTAT

3.11.1 Background

The Bring Your Own Thermostat Program (BYOT) is a further expansion of the Residential Smart/Wi-Fi thermostat initiative approved in 2016. BYOT allows customers who have or will purchase their own thermostat from multiple potential vendors to participate in demand response (DR) and other load curtailing programs managed through the utility. The program allows the utility to avoid the costs of hardware, installation, and maintenance associated with traditional load control methods.

By taking advantage of two-way communicating smart Wi-Fi thermostats, BYOT programs can help utilities reduce acquisition costs for load curtailment programs and improve customer satisfaction. Through the use of smart/Wi-Fi enabled thermostats, the utility can remotely verify how many customers are connected to the network at any given time and determine which thermostats are participating in DR events.

Any residential customer who receives electric service from Vectren South at a single-family residence is eligible to participate in the program. Customers will receive a one-time enrollment incentive of \$75 and a bill credit of \$5 during the months of June through September. The enrollment incentive, the amount which was determined based on research of other utility BYOT programs, will be provided in the first year to new enrollees only.

3.11.2 Relation to Vectren's Market Potential Study

The Market Potential Study indicated that there is substantial room in the market for this program.

3.12 SMART CYCLE

3.12.1 Background

Since 1992, Vectren South has operated a Direct Load Control (DLC) program called Summer Cycler that reduces residential and small commercial air-conditioning and water heating electricity loads during summer peak hours.

The Smart Cycle program will replace traditional DLC switches with smart thermostats over time, as the benefits associated with smart thermostats far outweigh the benefits associated with DLC switches. Smart thermostats provide an alternative to traditional residential load control switches as well as enhance the way customers manage and understand their home energy use. By installing connected devices in customer homes rather than using one-way signal switches, Vectren will be able to provide its customer base with deeper energy savings opportunities and shift future energy focus to customer engagement rather than traditional program goals and rules. The most recent Vectren electric DSM evaluation has demonstrated that smart thermostats outperform standard programmable thermostats and are a practical option to transition into future customer engagement strategies.

Customers in the Vectren South territory who currently participate in the DLC Summer Cycler Program and have access to Wi-Fi are eligible for the program. Customers receive a professionally-installed Wi-Fi thermostat at no additional cost and a monthly bill credit of \$5 during the months of June through September. The current monthly credit for Summer Cycler is also \$5; therefore, the annual bill credit by customer does not change.

3.12.2 Relation to Vectren's Market Potential Study

The Market Potential Study indicates that there is market potential well above Action Plan participation estimates in this program.

3.13 COMMERCIAL AND INDUSTRIAL PRESCRIPTIVE

3.13.1 Background

The Commercial & Industrial (C&I) Prescriptive Program is designed to provide financial incentives on qualifying products to produce greater energy savings in the C&I market. The rebates are designed to promote lower electric energy consumption, assist customers in managing their energy costs, and build a sustainable market around energy efficiency (EE). Program participation is achieved by offering incentives structured to cover a portion of the customer's incremental cost of installing prescriptive efficiency measures. Any participating commercial or industrial customer receiving electric service from Vectren South is eligible to participate in the program.

Top performing measures include:

- High-efficiency lighting and lighting controls
- HVAC equipment such as air conditioners, air-source heat pumps, chillers, boilers, and furnaces

New measures will include:

- Smart thermostats
- Refrigerator strip curtains
- High-efficiency hand dryers
- Efficient low-temperature compressors for refrigerators
- Refrigeration tune-ups
- Duct sealing

The full list of measures can be found in the measure library in Appendix K.

The program is delivered primarily through trade allies. Vectren South and its implementation partners work with the trade allies to make them aware of the offerings and help them promote the program to their customers. The implementation partner will provide training and technical support to the trade allies to become familiar with the EE technologies offered through the program. The program will be managed by the same implementation provider as the C&I Custom Program so that customers can seamlessly receive assistance and all incentives can be efficiently processed through a single procedure.

Incentives are provided to customers to reduce the difference in first cost between the lower-efficiency technology and the high-efficiency option. There is no fixed incentive percentage amount based on the difference in price because some technologies are newer and need higher amounts. Others have been available in the marketplace longer and do not need as much incentive to motivate customers. To verify the correct equipment was installed, site visits will be made on 5% of the installations, as well as all projects receiving incentive greater than \$20,000.

3.13.2 Relation to Vectren's Market Potential Study

The team cross-referenced measures from the Market Potential Study with measures included in the C&I Prescriptive Program. As measures from the C&I Prescriptive Program also appear in the Small Business Program, the team also compared the rate of sales in this program to the C&I Prescriptive Program. From this analysis, the team estimated that most measures from the C&I Prescriptive Program have market potential well above Action Plan participation estimates. For a select few measures (high-bay and low-bay LED lighting, refrigerated LEDs, commercial dishwashers, and 90% TE boilers sized at or above 1,000 MBH), the Market Potential Study provided a lower estimate of future participants than previously experienced by the program. The team capped participation at the total number of participants estimated in the potential study for these measures.

3.13.3 Program Considerations

Advances in technology pose a risk to estimates for the C&I Prescriptive Program, although the size, scope, and directionality of that impact are difficult to define. The team developed estimates to address the largest risks to program savings: overall participation and NTG. The team modeled previous NTG estimates and tried to fit Action Plan NTGs to the trend of these historical NTG estimates.

Due to low cost-effectiveness scores in the Market Potential Study, the team dropped plug load sensors, smart power strips, window film, 90% AFUE boilers sized at less than 400 MBH, gas convection ovens, gas griddles, fluorescent lighting, and steam boilers.

3.13.4 Technology and Program Data

The following table provides summary of the C&I Prescriptive Program energy impacts and budget.

TABLE 3-11 COMMERCIAL AND INDUSTRIAL PRESCRIPTIVE— IMPACTS AND BUDGET

	2020	2021	2022	2023	2024	2025
Number of Participants	42,431	48,449	52,971	55,283	55,739	53,882
Energy Savings kWh	14,490,335	15,981,655	17,154,963	17,821,076	18,058,503	17,825,085
Peak Demand kW	3,808	4,131	4,383	4,524	4,573	4,514
Total Program Budget	\$2,047,886	\$2,163,627	\$2,239,173	\$2,262,354	\$2,245,657	\$2,189,060
Per Participant Energy Savings (kWh)	342	330	324	322	324	330
Per Participant Demand Savings (kW)	0.09	0.08	0.08	0.08	0.08	0.08
Per Participant Average Incentive	\$32	\$29	\$27	\$26	\$25	\$25
Weighted Average Measure Life	15	15	15	15	14	14
Incremental Technology Cost	\$91	\$85	\$79	\$74	\$70	\$66
Net-to-Gross Ratio	80%	80%	80%	80%	80%	80%

Note: Number of participants, energy savings, and demand savings estimates based primarily on Market Potential Study results and on estimates from Market Potential Study and 2017 EM&V report. Program budget estimate based on current schedule of work and projected rising costs from Vectren Program Cost and Measure Data spreadsheet. Per unit savings estimates based on the Market Potential Study results. Per participant energy savings, per participant demand savings, and incremental technology cost weighted by participant. Linear LED lighting incentives and incremental costs are discounted by 33% from 2020 to 2025 based on findings from the DOE's Energy Savings Forecast of Solid-State Lighting in General Illumination Applications 2016 report. Weighted average measure life and net to gross ratio weighted by kWh.

3.14 COMMERCIAL AND INDUSTRIAL CUSTOM

3.14.1 Background

The C&I Custom Program promotes the implementation of customized energy-saving projects at qualifying customer facilities. Incentives promoted through this program serve to reduce the cost of implementing energy-reducing projects and upgrading to high-efficiency equipment. Due to the nature of Vectren's custom program, a wide variety of projects are eligible, including conventional custom retrofit projects, new construction (Commercial New Construction) projects, and major renovation (Building Tune-Up) projects. Beginning in 2020, Vectren will pilot a Strategic Energy Management component, an Advanced Lighting Controls component, and a Midstream HVAC component. As the design of the pilots will depend on Vectren-specific market research into C&I customers, the team did not establish the precise program design of the pilots nor the precise incentive structure.

Any participating commercial or industrial customer receiving electric service from Vectren South is eligible to participate in the C&I Custom Program. In addition to this requirement, the Building Tune-Up component also requires buildings to be at least 50,000 square feet. For the pilot components, the implementer will target a small group of participants to test the viability of the concept in Vectren territory.

3.14.1.1 Conventional Custom Projects

Similar to previous program years, customers may propose new custom retrofit projects. Customers or trade allies with a proposed project complete an application form with the energy savings calculations for the project. The implementation team reviews all calculations and, where appropriate, completes site visits to assess and document pre-installation conditions. The implementer then informs that their project has been pre-approved and their funds are reserved for the project. Implementation engineering staff review the final project information as installed and verify the energy savings. Incentives are then paid on the verified savings. Given the variability and uniqueness of each project, all projects are pre-approved. Pre- and post-installation visits to the site to verify installation and savings are performed as defined by the program implementation partner. Monitoring and verification may occur on the largest projects. This component provides incentives based on the kWh saved as calculated by the engineering analysis.

3.14.1.2 Commercial New Construction

The Commercial New Construction (CNC) component promotes energy-efficient designs with the goal of developing projects that are more energy efficient than current Indiana building code. This program applies to new construction and major renovation projects. Major renovation is defined as the replacement of at least two systems within an existing space (e.g., lighting, HVAC, controls, building envelope). The program provides incentives as part of the facility design process to explore opportunities in modeling EE options to craft an optimal package of investments. The program also offers customers the opportunity to receive prescriptive or custom rebates toward eligible equipment in order to reduce the higher capital cost for an energy efficient solution.

To help overcome financial challenge of designing energy-efficient new construction projects, Vectren offers a Standard Energy Design Assistance (“EDA”). This provides additional engineering expertise during the design phase to identify energy-saving opportunities. C&I projects for buildings greater than 100,000 square feet still in the conceptual design phase qualify for Vectren South’s Enhanced EDA incentives which include energy modeling. The Vectren South implementation partner staff expert works with the design team through the conceptual design, schematic design, and design development processes, providing advice and counsel on measures that should be considered and EE modeling issues. Incentives are paid after the design team submits completed construction documents for review to verify that the facility design reflects the minimum energy savings requirements.

CNC provides incentives to help offset some of the expenses for the design team’s participation in the EDA process with the design team incentive. The design team incentive is a fixed amount based on the new/renovated conditioned square footage and is paid when the proposed EE projects associated with the construction documents exceed a minimum energy savings threshold. The program also offers customers the opportunity to receive prescriptive or custom rebates toward eligible equipment in order to reduce the higher capital cost for the EE solutions.

3.14.1.3 Building Tune-Up (BTU)

The BTU component provides a targeted, turnkey, and cost-effective retro-commissioning solution for small- to mid-sized customer facilities. It is designed as a comprehensive customer solution that will identify, validate, quantify, and encourage the installation of both operational and capital measures. The majority of these measures will be no- or low-cost with low payback periods and will capture energy savings from a previously untapped source: building automation systems.

The BTU component is designed to encourage high levels of implementation by customers seeking to optimize the operation of their existing HVAC system. BTU typically targets customers with buildings between 50,000 square feet and 150,000 square feet. Facility energy assessments are offered to customers who are eligible and motivated to

implement multiple energy efficiency measures. BTU specifically targets measures that provide no- and low-cost operational savings. Most measures involve optimizing the building automation system (BAS) settings, but the program also investigates related capital measures, like controls, operations, processes, and HVAC. The implementation partner works collaboratively with Vectren South staff to recruit and screen customers for receiving facility energy assessments.

The following table describes the specific savings requirements related to each incentive:

TABLE 3-12 INCENTIVE SAVINGS REQUIREMENTS

Facility Size – Square Feet	Design Team Incentives	Minimum Savings
Small <25,000	\$750	25,000 kWh
Medium 25,000 - 100,000	\$2,250	75,000 kWh
Large >100,000	\$3,750	150,000 kWh
Enhance Large >100,000	\$5,000	10% beyond code

3.14.1.4 Strategic Energy Management Pilot

The Strategic Energy Management Pilot (SEM) is a guided operations and maintenance program with benchmarking and regular follow-up meetings to chart customer performance. The implementer will recruit customers to participate in the program and achieve energy savings for their facilities. The implementer will then measure their performance over time (usually a period of 6 months or a year) using energy billing data to determine the amount of energy savings the customer achieved and provide incentives to the customer accordingly. Depending on market research, the SEM pilot may also include cohorts of participants and inter-cohort and intra-cohort competition. Vectren may require the SEM pilot to fit Department of Energy (DOE) 50,001 Ready specifications. This DOE program model attempts to standardize programs across states and jurisdictions to give companies with facilities in more than one utility jurisdiction the opportunity to participate in SEM programs using similar qualification criteria and with similar program applications.

3.14.1.5 Advanced Lighting Controls Pilot

The Advanced Lighting Controls Pilot (ALC) will incentivize networked lighting control systems that include daylighting and/or occupancy sensors in the lighting fixtures. Like conventional custom projects, engineers will review project applications to establish conventional energy savings. Unlike the conventional custom projects, ALC projects may also include additional estimates for reduced hours-of-use or hours of lower energy use resulting from daylighting and/or occupancy sensors in the networked lighting.

3.14.1.6 Midstream HVAC Pilot

The Midstream HVAC Pilot will provide incentives to actors at the distributor level (firms positioned between the manufacturer and the end user). The pilot will provide incentives for HVAC equipment such as package units, heat pumps, room AC, split systems, and chillers.

Through midstream HVAC incentives, the program aims to influence the equipment that distributors stock, fine-tune incentives to fit desired program outcomes, and address the needs of the replace-on-burnout market. Because distributors have a large influence on the HVAC equipment that C&I customers eventually install, the pilot will be able to encourage distributors to supply more energy-efficient options. Midstream HVAC incentives can be more easily adjusted, as C&I customers receive the discount at the time of equipment purchase, not after a lengthy application process. Because C&I customers receive a discount at the time of purchase, the pilot may influence more quick-fire purchasing decisions such as replace-on-burnout purchases. C&I customers will not be encumbered by a lengthy application process to replace their defunct HVAC equipment.

3.14.3 Relation to Vectren's Market Potential Study

The Market Potential Study identified room in C&I markets, but due to the unique nature of each custom program project, it is difficult to compare Market Potential Study opportunity to Action Plan estimates.

3.14.3 Program Considerations

The team assumed that average participation rates from the C&I Custom Program would produce a rough estimate of participation for the program in the future. Due to the wide variations in program savings and number of participating projects over the years, this estimate has a very wide error bound.

3.14.4 Technology and Program Data

The following table provides summary of the C&I Custom Program energy impacts and budget.

TABLE 3-13 COMMERCIAL AND INDUSTRIAL CUSTOM – IMPACTS AND BUDGET

	2015	2016	2017	2018	2019	2020
Number of Participants	196	196	196	196	196	196
Energy Savings kWh	6,107,234	6,107,234	6,107,234	6,107,234	6,107,234	6,107,234
Peak Demand kW	740	740	740	740	740	740
Total Program Budget	\$896,299	\$902,775	\$909,355	\$916,040	\$922,832	\$929,733
Per Participant Energy Savings (kWh)	31,159	31,159	31,159	31,159	31,159	31,159
Per Participant Demand Savings (kW)	3.78	3.78	3.78	3.78	3.78	3.78
Per Participant Average Incentive	\$2,508	\$2,508	\$2,508	\$2,508	\$2,508	\$2,508
Weighted Average Measure Life	16	16	16	16	16	16
Incremental Technology Cost	\$26,185	\$26,185	\$26,185	\$26,185	\$26,185	\$26,185
Net-to-Gross Ratio	100%	100%	100%	100%	100%	100%

Note: Number of participants, energy savings, and program costs estimated based on program estimates for the 2015-2017 energy efficiency scorecards. Demand savings estimated based on the 2018 Operating Plan. Weighted average measure life and net to gross ratio weighted by kWh.

3.15 SMALL BUSINESS ENERGY SOLUTIONS

3.15.1 Background

The Small Business Energy Solutions Program (SBES) provides value by directly installing EE products such as high-efficiency lighting, pre-rinse sprayers, refrigeration controls, electrically-commutated motors, smart thermostats, and vending machine controls. The program helps small businesses and multi-family customers identify and install cost-effective energy-saving measures by providing an onsite energy assessment customized for their business.

Any participating Vectren South business customer with a maximum peak energy demand of less than 400 kW is eligible to participate in the program. Additionally, multi-family building owners with Vectren general electric service may qualify for the program, including apartment buildings, condominiums, cooperatives, duplexes, quadrplexes, townhomes, nursing homes, and retirement communities.

Trained trade ally energy advisors provide energy assessments to business customers with less than 400 kW peak demand and to multi-family buildings. The program implementer issues an annual Request for Qualification (RFQ) to select the trade allies with the best ability to provide high-quality and cost-effective service to small businesses and provide training to SBES trade allies on the program process, with an emphasis on improving energy efficiency sales.

Trade allies walk through small businesses and record site characteristics and energy efficiency opportunities at no cost to the customer. They provide an energy assessment report that details customer-specific opportunities, costs, energy savings, incentives, and simple payback periods. The trade ally then reviews the report with the customer, presenting the program benefits and process, while addressing any questions.

The program has two types of measures provided. The first type of measures are installed at no cost to the customer. They include, but are not limited to, the following:

- ❑ LEDs
- ❑ Wifi-enabled thermostats
- ❑ Programmable thermostats
- ❑ High efficiency pre-rinse sprayers
- ❑ Faucet aerators
- ❑ Weather stripping (exterior door)

The second types of measures require the customer to pay a portion of the labor and materials. These measures include:

- ❑ Interior LED lighting
- ❑ Exterior LED lighting
- ❑ EC Motors
- ❑ Anti-sweat heater controls
- ❑ Refrigerated LED lighting and case covers
- ❑ Lighting control
- ❑ Vending machine control
- ❑ Smart thermostats

In addition to the no-cost measures identified during the audit, the program also pays a cash incentive on every recommended and implemented improvement identified through the assessment. Incentive rates may change over time and vary with special initiatives.

Onsite verification is provided for the first three projects completed by each trade ally, in addition to the program standard of 5% of all completed projects and all projects receiving incentives greater than \$20,000. These verifications allow the program to validate energy savings, in addition to providing an opportunity to ensure trade allies provide high-quality customer services and the incentivized equipment satisfies program requirements.

3.15.10 Relation to Vectren's Market Potential Study

The Market Potential Study identified savings for the overall C&I sectors but provided less-specific estimates for the small business sector. As participation in the program is small, the team assumed that historic participation trends would continue through the timeline of the action plan.

3.15.11 Program Considerations

The team reviewed estimates for the impact of the EISA backstop in other jurisdictions and found that the EISA backstop will have a much smaller impact on C&I programs compared to residential programs. This research also indicated that small businesses will face a larger impact from the backstop as their lighting characteristics more closely resemble the residential market. Because of this impact, the team assumed decreasing participation in lighting measures impacted by the EISA backstop after 2021.

The team dropped fluorescent lighting from the program as the technology will be superseded by linear LEDs and savings from LEDs are much more substantial.

3.15.4 Technology and Program Data

The following table provides summary of SBES energy impacts and budget.

TABLE 3-14 SMALL BUSINESS ENERGY SOLUTIONS – IMPACTS AND BUDGET

	2018	2021	2022	2023	2024	2025
Number of Participants	381	382	382	382	383	383
Energy Savings kWh	2,940,932	2,944,615	2,949,771	2,952,715	2,957,870	2,963,026
Peak Demand kW	213	213	213	213	213	213
Total Program Budget	\$768,835	\$763,876	\$758,758	\$752,586	\$747,582	\$742,637
Per Participant Energy Savings (kWh)	7,719	7,708	7,722	7,730	7,723	7,736
Per Participant Demand Savings (kW)	0.56	0.56	0.56	0.56	0.56	0.56
Per Participant Average Incentive	\$1,439	\$1,412	\$1,390	\$1,365	\$1,338	\$1,315
Weighted Average Measure Life	15	15	15	15	15	15
Incremental Technology Cost	\$312	\$311	\$310	\$310	\$309	\$308
Net-to-Gross Ratio	91%	91%	91%	91%	91%	91%

Note: Number of participants, energy savings, and demand savings estimated based on the 2018 Operating Plan. Program costs estimated using the current program SOW and projected rising costs from 2018-20 filed Energy Efficiency Plan and Vectren Program Cost and Measure Data spreadsheet. Per participant average incentive and incremental technology cost estimated by summing the values for each piece of equipment and dividing by the number of participants. Linear LED lighting incentives and incremental costs are discounted by 33% from 2020 to 2025 based on findings from the DOE's Energy Savings Forecast of Solid-State Lighting in General Illumination Applications 2016 report. Weighted average measure life and net to gross ratio are weighted by kWh.

3.16 CONSERVATION VOLTAGE REDUCTION

3.16.1 Background

Conservation Voltage Reduction (CVR) achieves energy conservation through automated monitoring and control of voltage levels provided on distribution circuits. End use customers realize lower energy and demand consumption when CVR is applied to the distribution circuit from which they are served.

CVR is both a DR and an EE program. It targets distribution circuits, in part to reduce the peak demand experienced on Vectren's electrical power supply system. The voltage reduction stemming from the CVR program operates to effectively reduce consumption during the times in which system peaks are set and as a result directly reduces peak demand. CVR also cost-effectively reduces the level of ongoing energy consumption by end-use devices located on the customer side of the utility meter, as many end-use devices consume less energy with lower voltages consistently applied. Like an equipment maintenance service program, the voltage optimization allows the customer's equipment to operate at optimum levels which saves energy without requiring direct customer intervention or change.

Delivery of the CVR Program will be achieved through the installation of control logic, telecommunication equipment, and voltage control equipment in order to control the voltage bandwidth on CVR circuits within voltage compliance levels required by the Indiana Utility Regulatory Commission.

3.16.2 Program Considerations

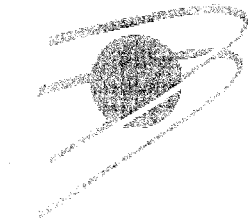
The team assumed similar participation in conservation voltage reduction as in previous years.

VOLUME III

APPENDICES

*2020-2025 Integrated Electric DSA / Market
Potential Study & Action Plan*

prepared for



VECTREN
Live Smart

JANUARY 2019

VOLUME III *Electric Appendices*

Electric DSM Market Potential Study

- A Sources
- B Residential Market Potential Study Measure Detail
- C Commercial Market Potential Study Measure Detail
- D Industrial Market Potential Study Measure Detail
- E Commercial Opt-Out Results
- F Industrial Opt-Out Results
- G Demand Response Opt-Out Results

Electric Action Plans

- H Combined Gas & Electric Portfolio Summary
- I Combined Gas & Electric Costs Summary
- J Market Research
- K Measure Library

APPENDIX A *DSM Market Potential Study Sources*

This appendix catalogs many of the data sources used in this study, grouped by major activity. In general, GDS attempted to utilize Vectren-specific data, where available. When Vectren-specific data was not available or reliable, GDS leveraged secondary data from nearby or regional sources.

A.1 MARKET RESEARCH

Market research studies were used to understand home and business characteristics and equipment stock characteristics. Vectren supplied GDS with several residential market research studies, and GDS conducted primary research in the small commercial sector to gather additional equipment and efficiency characteristics.

- *Vectren Residential Market Research Studies:* The electric measure analysis was largely informed by a 2016 baseline survey of Vectren South customers. Nearly 500 responses to this survey provided a strong basis for many of the Vectren South electric measure baseline and efficient saturation estimates. A 2015 CFL and LED baseline study helped inform the saturation estimates for the lighting end use. A 2017 electric baseline thermostat survey of Vectren customers was leveraged to better characterize the increased prominence of smart and Wi-Fi-enabled thermostats.
- *Vectren Commercial Primary Market Research:* GDS collected data in 38 commercial facilities to better understand electric and natural gas equipment saturation and efficiency characteristics.
- *Industrial Surveys:* Vectren survey data was leveraged to determine the remaining factors for several end-uses, including motors, interior and exterior lighting and fixture measures.
- *EIA/DOE Industrial Data:* Including the DOE Industrial Electric Motor Systems Market Opportunities Report, the DOE Assessment of the Market for Compressed Air Efficiency Services, and EIA Industrial Demand Module of the National Energy Modeling System.
- *US American Community Survey:* Public Use Microdata Survey data was used to estimate the percent of low-income households (using annual household income and number of people per household) in the Vectren South and North territories.
- *Energy Star Shipment Data:* Energy Star shipment data provides a detailed historical estimate of the percent of shipped equipment/appliances that meet ENERGY STAR standards. Over the long-term, this serves as a proxy for the percent of the market that could be considered energy efficient.

A.2 FORECAST CALIBRATION

The forecast calibration effort was used to create a detailed segmentation of Vectren's load forecast and ensure that estimated savings would not overstate future potential. Vectren supplied GDS with the most recent load forecast.

- *Vectren Load Forecast:* The 2016 Long-Term Electric Energy and Demand load forecast consists of the most recent ITRON load forecast completed for VEDI for 2016-2036. The natural gas forecast was provided directly from Vectren for the North and South territories from 2017 to 2027. Future years were escalated by a compound average annual growth rate.
- *Vectren Commercial and Industrial Customer Forecast:* The 2017 historical commercial and industrial data utilized rate codes and existing NAICS code to segment historical sales by commercial building type and/or industry type.
- *InfoUSA:* GDS utilized a third-party dataset that provided additional commercial and industrial business information, including NAICS codes, to supplement the building/industry types codes supplied by Vectren
- *EIA Commercial Building Energy Consumption Survey:* GDS updated the ITRON load forecast to utilize more recent information for the East South-Central region from the EIA 2012 CBECS survey.

- *EIA Manufacturing Energy Consumption Survey*: GDS used the 2014 study to further refine the industrial load forecast by end-use.
- *BEopt*: GDS developed residential building prototypes from the market research effort to develop detailed consumption estimates by end-use and calibrated these models to Vectren's residential load forecasts.

A.3 ENERGY EFFICIENCY MEASURE DATA

The energy efficiency measure analysis developed per unit savings, cost, and useful life assumptions for each energy efficiency measure in the residential, commercial, and industrial sectors. Preference was given to Vectren-specific evaluated savings and/or deemed savings/algorithms in the Indiana TRM.

- *2017 Vectren EM&V Report (Cadmus)*: For the development of savings estimates of measures already offered by Vectren, GDS either used the estimates from the most recent evaluation reports or used the evaluation methodology to develop forward looking savings projections.
- *Indiana TRM v2.2*: In the absence of evaluation data, GDS attempted to leverage the Indiana TRM. Assumptions and algorithms were based off the IN TRM to the extent practical.
- *Vectren Operating Plan*: Historical incentive estimates and in some cases, incremental measure costs, were based on the Vectren Operating Plans.
- *Other TRMs*: In some cases, TRM's or deemed measure databases from other states were more applicable than the IN TRM due to more currently available estimates and the more appropriate use of updated federal standards. The Illinois TRM and the Michigan Energy Measures Database were the primary non-Indiana TRMs used.
- *Other Secondary Sources*: In some cases, following the source hierarchy listed above was not enough to develop savings estimates. In these cases, GDS leveraged other secondary research documents such as ACEEE emerging technology reports.

A.4 DEMAND RESPONSE / CVR MEASURE ANALYSIS

The DR/CVR analysis developed per unit savings, cost, and useful life assumptions for select demand response programs, and included assumptions regarding future CVR potential from two additional substations.

- *Vectren programs / 2012 FERC DR Survey*: Demand reductions were based on load reductions found in Vectren's existing demand response programs, and various secondary data sources including the FERC and other industry reports, including demand response potential studies.
- *Indiana TRM v2.2*: In the absence of evaluation data, GDS attempted to leverage the Indiana TRM. Assumptions and algorithms were based off the IN TRM to the extent practical.
- *Comverge*: Comverge provided an estimate of the load control switch useful life.
- *Nest and Ecobee*: Nest and Ecobee product data was used to develop equipment cost assumptions.
- *Other DR Potential Studies*: the absence
- *EM&V Analysis of Buckwood Pilot Program*: Energy and demand impacts for the CVR analysis
- *Power System Engineering Report*: Energy and demand impacts for the CVR analysis

A.5 AVOIDED COST/ECONOMIC ANALYSIS

Avoided costs and related economic assumptions were used to assess cost-effectiveness. In addition, historical incentive levels were tied to willingness-to-participate (WTP) research to assess long-term market adoption in the achievable potential scenario.

- *Electric and Natural Gas Avoided Costs*: Avoided cost values for electric energy, electric capacity, and avoided transmission and distribution (T&D) were provided by Vectren as part of an initial data request. Electric energy is based on an annual system marginal cost. For years outside of the avoided cost forecast timeframe, future year

avoided costs are escalated by the rate of inflation. Natural gas avoided costs are calculated using EIA Annual Outlook reference tables combined with demand rates and basis differentials provided by Vectren Gas Supply.

- *Other Economic Assumptions:* Includes the discount rate, inflation rate, line loss assumptions and reserve margin requirement. All economic assumptions were provided by Vectren and consistent with economic modeling assumptions used for other utility planning efforts.
- *Historical DSM Filings/Scorecards:* Historical DSM costs and savings data from 2011 to 2017 were used to determine non-incentive program delivery costs as well as cross-cutting portfolio costs.
- *Primary Market Research:* Vectren conducted over 300 surveys in the residential sector (online only) and 38 on-site surveys in the commercial sector regarding customer willingness-to-purchase energy efficient equipment at various incentive levels. This Vectren-specific customer data was used to determine long-term adoption rates by end-use for the MAP and RAP achievable potential scenarios.

APPENDIX B *DSM Market Potential Study Residential Measure Detail*

Vectren Electric Residential Measure Assumptions

Measure #	Category	Measure Name	Form Type	Income Type	Replacement	Base Measure	% Savings	Base Measure Savings	ES Measure Savings	ES Measure	ES Measure	ES Measure	ES Measure	ES Measure	ES Measure
1001	Appliances	ENERGY STAR Air Purifier	SF	N/A	MO	733.0	67%	488.0	0.084	9.0	\$70.00	\$25.00	9.24	Air Purifier meeting ENERGY STAR spec	
1002	Appliances	ENERGY STAR Refrigerator	SF	NLI	MO	569.0	9%	53.0	0.008	17.0	\$40.00	\$20.00	2.05	ES Qualified Refrigerator (~9% more efficient)	
1003	Appliances	Smart Refrigerator_ET	SF	NLI	MO	569.0	12%	70.0	0.011	17.0	\$680.00	\$340.00	0.16	ES Qualified Refrigerator w/ Smart Technology	
1004	Appliances	ES Refrigerator Replacement	SF	LI	DI	1,193.0	36%	412.2	0.063	17.0	\$580.00	\$580.00	0.55	Replace Existing Refrigerator with ES Qualified Unit	
1005	Appliances	Refrigerator Recycling	SF	N/A	Recycle	1,044.0	100%	1,044.0	0.140	8.0	\$130.00	\$130.00	3.14	Refrigerator Recycle (No Replacement)	
1006	Appliances	ENERGY STAR Clothes Washer (Electric WH/Dryer)	SF	N/A	MO	522.0	22%	112.4	0.430	14.0	\$84.00	\$40.00	1.95	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1007	Appliances	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	MO	383.7	27%	101.8	0.390	14.0	\$84.00	\$40.00	1.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1008	Appliances	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	MO	42.3	44%	18.5	0.071	14.0	\$84.00	\$40.00	0.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1009	Appliances	Smart/CEE Tier3 Clothes Washer (Electric WH/Dryer)_ET	SF	N/A	MO	522.0	40%	209.2	0.801	14.0	\$141.00	\$70.00	2.07	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1010	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)_ET	SF	N/A	MO	383.7	26%	100.9	0.366	14.0	\$141.00	\$70.00	1.33	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1011	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)_ET	SF	N/A	MO	42.3	-3%	-1.2	-0.005	14.0	\$141.00	\$70.00	0.62	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1012	Appliances	ENERGY STAR Dishwasher (E WH)	SF	N/A	MO	307.0	12%	37.0	0.105	11.0	\$76.00	\$40.00	0.42	ES Qualified Dishwasher (v3.0)	
1013	Appliances	ENERGY STAR Dishwasher (NG WH)	SF	N/A	MO	135.1	12%	16.3	0.046	11.0	\$79.00	\$40.00	0.27	ES Qualified Dishwasher (v3.0)	
1014	Appliances	Smart Dishwasher (E WH)_ET	SF	N/A	MO	307.0	15%	45.5	0.129	11.0	\$395.00	\$200.00	0.10	Smart ES Qualified Dishwasher (v3.0)	
1015	Appliances	Smart Dishwasher (NG WH)_ET	SF	N/A	MO	135.1	15%	20.0	0.057	11.0	\$395.00	\$200.00	0.07	Smart ES Qualified Dishwasher (v3.0)	
1016	Appliances	ENERGY STAR Dehumidifier	SF	N/A	MO	904.6	20%	180.9	0.111	12.0	\$9.52	\$5.00	24.59	ES Qualified Dehumidifier (L/kWh = 2.0)	
1017	Appliances	ENERGY STAR Freezer	SF	N/A	MO	349.5	10%	35.1	0.006	22.0	\$35.00	\$20.00	1.64	ES Qualified Freezer (10% more Efficient than NAECA)	
1018	Appliances	Freezer Recycling	SF	N/A	Recycle	927.0	100%	927.0	0.100	8.0	\$130.00	\$130.00	2.62	Freezer Recycle (No Replacement)	
1019	Appliances	ENERGY STAR Clothes Dryer (Electric)	SF	NLI	MO	768.9	21%	160.4	0.567	16.0	\$152.00	\$75.00	1.52	ES Qualified Dryer (CEF=3.93)	
1020	Appliances	ENERGY STAR Clothes Dryer (NG)	SF	NLI	MO	123.0	21%	25.7	0.091	16.0	\$152.00	\$75.00	0.57	ES Qualified Dryer (CEF=3.93)	
1021	Appliances	Smart Clothes Dryer (Electric)_ET	SF	NLI	MO	768.9	26%	202.7	0.716	16.0	\$236.00	\$120.00	1.20	Smart ES Qualified Dryer (5.5% additional energy savings)	
1022	Appliances	Smart Clothes Dryer (NG)_ET	SF	NLI	MO	123.0	26%	32.4	0.116	16.0	\$236.00	\$120.00	0.45	Smart ES Qualified Dryer (5.5% additional energy savings)	
1023	Appliances	Heat Pump Dryer	SF	NLI	MO	768.9	73%	558.0	1.972	12.0	\$412.00	\$205.00	1.57	Heat Pump Dryer (CEF=10.4)	
1024	Appliances	Dryer Vent Cleaning (Electric)	SF	LI	DI	768.9	6%	42.3	0.149	2.0	\$80.00	\$80.00	0.06	Dryer Vent Cleaning (5.5% Savings)	
1025	Appliances	Dryer Vent Cleaning (NG)	SF	LI	DI	123.0	6%	6.8	0.024	2.0	\$80.00	\$80.00	0.02	Dryer Vent Cleaning (5.5% Savings)	
1026	Appliances	ENERGY STAR Water Cooler	SF	N/A	MO	105.9	46%	48.6	0.006	10.0	\$17.00	\$10.00	2.22	ES Water Cooler (Cold Water Only)	
1027	Appliances	ENERGY STAR Air Purifier	SF	N/A	NC	733.0	67%	488.0	0.084	9.0	\$70.00	\$25.00	9.24	Air Purifier meeting ENERGY STAR spec	
1028	Appliances	ENERGY STAR Refrigerator	SF	N/A	NC	569.0	9%	53.0	0.008	17.0	\$40.00	\$20.00	2.05	ES Qualified Refrigerator (~9% more efficient)	
1029	Appliances	Smart Refrigerator_ET	SF	N/A	NC	569.0	12%	70.0	0.011	17.0	\$680.00	\$340.00	0.16	ES Qualified Refrigerator w/ Smart Technology	
1030	Appliances	ENERGY STAR Clothes Washer (Electric WH/Dryer)	SF	N/A	NC	522.0	22%	112.4	0.430	14.0	\$84.00	\$40.00	1.95	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	

Vectren Electric Residential Measure Assumptions

Measure #	Category	Measure Name	Home Type	Income Type	Replacement Cost	Base Annual Demand	% Reduction Savings	Req Rate (kWh)	Req Rate (kWh/yr)	Req Rate (kWh/yr)	Annual kWh	Market Cost	Market Savings	Net Cost	Measure Description
1031	Appliances	ENERGY STAR Clothes Washer (NG WH/E Dryer)	SF	N/A	NC	383.7	27%	101.8	0.390	14.0	\$84.00	\$40.00	1.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1032	Appliances	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	SF	N/A	NC	42.3	44%	18.5	0.071	14.0	\$84.00	\$40.00	0.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1033	Appliances	Smart/CEE Tier3 Clothes Washer (Electric WH/Dryer)_ET	SF	N/A	NC	522.0	40%	209.2	0.801	14.0	\$141.00	\$70.00	2.07	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1034	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)_ET	SF	N/A	NC	383.7	26%	100.9	0.386	14.0	\$141.00	\$70.00	1.33	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1035	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)_ET	SF	N/A	NC	42.3	-3%	-1.2	-0.005	14.0	\$141.00	\$70.00	0.62	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1036	Appliances	ENERGY STAR Dishwasher (E WH)	SF	N/A	NC	307.0	12%	37.0	0.105	11.0	\$76.00	\$40.00	0.42	ES Qualified Dishwasher (v3.0)	
1037	Appliances	ENERGY STAR Dishwasher (NG WH)	SF	N/A	NC	135.1	12%	16.3	0.046	11.0	\$79.00	\$40.00	0.27	ES Qualified Dishwasher (v3.0)	
1038	Appliances	Smart Dishwasher (E WH)_ET	SF	N/A	NC	307.0	15%	45.5	0.129	11.0	\$395.00	\$200.00	0.10	Smart ES Qualified Dishwasher (v3.0)	
1039	Appliances	Smart Dishwasher (NG WH)_ET	SF	N/A	NC	135.1	15%	20.0	0.057	11.0	\$395.00	\$200.00	0.07	Smart ES Qualified Dishwasher (v3.0)	
1040	Appliances	ENERGY STAR Dehumidifier	SF	N/A	NC	904.6	20%	180.9	0.111	12.0	\$9.52	\$5.00	24.59	ES Qualified Dehumidifier (L/kWh = 2.0)	
1041	Appliances	ENERGY STAR Freezer	SF	N/A	NC	349.5	10%	35.1	0.006	22.0	\$35.00	\$20.00	1.64	ES Qualified Freezer (10% more Efficient than NAECA)	
1042	Appliances	ENERGY STAR Clothes Dryer (Electric)	SF	N/A	NC	768.9	21%	160.4	0.567	16.0	\$152.00	\$75.00	1.52	ES Qualified Dryer (CEF=3.93)	
1043	Appliances	ENERGY STAR Clothes Dryer (NG)	SF	N/A	NC	123.0	21%	25.7	0.091	16.0	\$152.00	\$75.00	0.57	ES Qualified Dryer (CEF=3.93)	
1044	Appliances	Smart Clothes Dryer (Electric)_ET	SF	N/A	NC	768.9	26%	202.7	0.716	16.0	\$236.00	\$120.00	1.20	Smart ES Qualified Dryer (5.5% additional energy savings)	
1045	Appliances	Smart Clothes Dryer (NG)_ET	SF	N/A	NC	123.0	26%	32.4	0.115	16.0	\$236.00	\$120.00	0.45	Smart ES Qualified Dryer (5.5% additional energy savings)	
1046	Appliances	Heat Pump Dryer	SF	N/A	NC	768.9	73%	558.0	1.972	12.0	\$412.00	\$205.00	1.57	Heat Pump Dryer (CEF=10.4)	
1047	Appliances	ENERGY STAR Water Cooler	SF	N/A	NC	105.9	46%	48.6	0.006	10.0	\$17.00	\$10.00	2.22	ES Water Cooler (Cold Water Only)	
1048	Appliances	ENERGY STAR Air Purifier	MF	N/A	MO	733.0	67%	488.0	0.084	9.0	\$70.00	\$25.00	9.24	Air Purifier meeting ENERGY STAR spec	
1049	Appliances	ENERGY STAR Refrigerator	MF	NLI	MO	569.0	9%	53.0	0.008	17.0	\$40.00	\$20.00	2.05	ES Qualified Refrigerator (-9% more efficient)	
1050	Appliances	Smart Refrigerator_ET	MF	NLI	MO	569.0	12%	70.0	0.011	17.0	\$680.00	\$340.00	0.16	ES Qualified Refrigerator w/ Smart Technology	
1051	Appliances	ES Refrigerator Replacement	MF	LI	DI	1,193.0	35%	412.2	0.063	17.0	\$580.00	\$580.00	0.55	Replace Existing Refrigerator with ES Qualified Unit	
1052	Appliances	Refrigerator Recycling	MF	N/A	Recycle	1,044.0	100%	1,044.0	0.140	8.0	\$130.00	\$130.00	3.14	Refrigerator Recycle (No Replacement)	
1053	Appliances	ENERGY STAR Clothes Washer (Electric WH/Dryer)	MF	N/A	MO	522.0	22%	112.4	0.430	14.0	\$84.00	\$40.00	1.95	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1054	Appliances	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	MO	383.7	27%	101.8	0.390	14.0	\$84.00	\$40.00	1.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1055	Appliances	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	MO	42.3	44%	18.5	0.071	14.0	\$84.00	\$40.00	0.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1056	Appliances	Smart/CEE Tier3 Clothes Washer (Electric WH/Dryer)_ET	MF	N/A	MO	522.0	40%	209.2	0.801	14.0	\$141.00	\$70.00	2.07	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1057	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)_ET	MF	N/A	MO	383.7	26%	100.9	0.386	14.0	\$141.00	\$70.00	1.33	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	

Vectren Electric Residential Measure Assumptions

Measure #	Category	Measure Description	Home Type	Income Type	Replacement Type	Annual Energy Savings (kWh)	% of Baseline	Net Present Value (\$)	Payback (Years)	Net Present Value (\$)	Annual Energy Savings (kWh)	Annual Energy Savings (\$)	Annual Energy Savings (\$)	ICPT	Measure Description
1058	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)_ET	MF	N/A	MO	42.3	-3%	-1.2	-0.005	14.0	\$141.00	\$70.00	0.62	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1059	Appliances	ENERGY STAR Dishwasher (E WH)	MF	N/A	MO	307.0	12%	37.0	0.105	11.0	\$76.00	\$40.00	0.42	ES Qualified Dishwasher (v3.0)	
1060	Appliances	ENERGY STAR Dishwasher (NG WH)	MF	N/A	MO	135.1	12%	16.3	0.046	11.0	\$79.00	\$40.00	0.27	ES Qualified Dishwasher (v3.0)	
1061	Appliances	Smart Dishwasher (E WH)_ET	MF	N/A	MO	307.0	15%	45.5	0.129	11.0	\$395.00	\$200.00	0.10	Smart ES Qualified Dishwasher (v3.0)	
1062	Appliances	Smart Dishwasher (NG WH)_ET	MF	N/A	MO	135.1	15%	20.0	0.057	11.0	\$395.00	\$200.00	0.07	Smart ES Qualified Dishwasher (v3.0)	
1063	Appliances	ENERGY STAR Dehumidifier	MF	N/A	MO	904.6	27%	246.7	0.151	12.0	\$75.00	\$40.00	4.19	ES Qualified Dehumidifier (l/kWh = 2.2)	
1064	Appliances	ENERGY STAR Freezer	MF	N/A	MO	349.5	10%	35.1	0.006	22.0	\$35.00	\$20.00	1.64	ES Qualified Freezer (10% more Efficient than NAECA)	
1065	Appliances	Freezer Recycling	MF	N/A	Recycle	927.0	100%	927.0	0.100	8.0	\$130.00	\$130.00	2.62	Freezer Recycle (No Replacement)	
1066	Appliances	ENERGY STAR Clothes Dryer (Electric)	MF	NLI	MO	768.9	21%	160.4	0.567	16.0	\$152.00	\$75.00	1.52	ES Qualified Dryer (CEF=3.93)	
1067	Appliances	ENERGY STAR Clothes Dryer (NG)	MF	NLI	MO	123.0	21%	25.7	0.091	16.0	\$152.00	\$75.00	0.57	ES Qualified Dryer (CEF=3.93)	
1068	Appliances	Smart Clothes Dryer (Electric)_ET	MF	NLI	MO	768.9	26%	202.7	0.716	16.0	\$236.00	\$120.00	1.20	Smart ES Qualified Dryer (5.5% additional energy savings)	
1069	Appliances	Smart Clothes Dryer (NG)_ET	MF	NLI	MO	123.0	26%	32.4	0.115	16.0	\$236.00	\$120.00	0.45	Smart ES Qualified Dryer (5.5% additional energy savings)	
1070	Appliances	Heat Pump Dryer	MF	NLI	MO	768.9	73%	558.0	1.972	12.0	\$412.00	\$205.00	1.57	Heat Pump Dryer (CEF=10.4)	
1071	Appliances	Dryer Vent Cleaning (Electric)	MF	LI	DI	768.9	6%	42.3	0.149	2.0	\$80.00	\$80.00	0.06	Dryer Vent Cleaning (5.5% Savings)	
1072	Appliances	Dryer Vent Cleaning (NG)	MF	LI	DI	123.0	6%	6.8	0.024	2.0	\$80.00	\$80.00	0.02	Smart ES Qualified Dryer (5.5% additional energy savings)	
1073	Appliances	ENERGY STAR Water Cooler	MF	N/A	MO	105.9	46%	48.6	0.006	10.0	\$17.00	\$10.00	2.22	ES Water Cooler (Cold Water Only)	
1074	Appliances	ENERGY STAR Air Purifier	MF	N/A	NC	733.0	67%	488.0	0.084	9.0	\$70.00	\$25.00	9.24	Air Purifier meeting ENERGY STAR spec	
1075	Appliances	ENERGY STAR Refrigerator	MF	N/A	NC	569.0	9%	53.0	0.008	17.0	\$40.00	\$20.00	2.05	ES Qualified Refrigerator (~9% more efficient)	
1076	Appliances	Smart Refrigerator_ET	MF	N/A	NC	569.0	12%	70.0	0.011	17.0	\$680.00	\$340.00	0.16	ES Qualified Refrigerator w/ Smart Technology	
1077	Appliances	ENERGY STAR Clothes Washer (Electric WH/Dryer)	MF	N/A	NC	522.0	22%	112.4	0.430	14.0	\$84.00	\$40.00	1.95	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1078	Appliances	ENERGY STAR Clothes Washer (NG WH/E Dryer)	MF	N/A	NC	383.7	27%	101.8	0.390	14.0	\$84.00	\$40.00	1.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1079	Appliances	ENERGY STAR Clothes Washer (NG WH/NG Dryer)	MF	N/A	NC	42.3	44%	18.5	0.071	14.0	\$84.00	\$40.00	0.82	ES Qualified ClothesWasher (IMEF=2.23 ; 1.75 Baseline)	
1080	Appliances	Smart/CEE Tier3 Clothes Washer (Electric WH/Dryer)_ET	MF	N/A	NC	522.0	40%	209.2	0.801	14.0	\$141.00	\$70.00	2.07	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1081	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/E Dryer)_ET	MF	N/A	NC	383.7	26%	100.9	0.386	14.0	\$141.00	\$70.00	1.33	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1082	Appliances	Smart/CEE Tier3 Clothes Washer (NG WH/NG Dryer)_ET	MF	N/A	NC	42.3	-3%	-1.2	-0.005	14.0	\$141.00	\$70.00	0.62	CEE Tier 3 Qualified ClothesWasher (IMEF=2.92 ; 1.75 Baseline)	
1083	Appliances	ENERGY STAR Dishwasher (E WH)	MF	N/A	NC	307.0	12%	37.0	0.105	11.0	\$76.00	\$40.00	0.42	ES Qualified Dishwasher (v3.0)	
1084	Appliances	ENERGY STAR Dishwasher (NG WH)	MF	N/A	NC	135.1	12%	16.3	0.046	11.0	\$79.00	\$40.00	0.27	ES Qualified Dishwasher (v3.0)	
1085	Appliances	Smart Dishwasher (E WH)_ET	MF	N/A	NC	307.0	15%	45.5	0.129	11.0	\$395.00	\$200.00	0.10	Smart ES Qualified Dishwasher (v3.0)	

Vectren Electric Residential Measure Assumptions

Measure #	Measure Type	Measure Name	Home Type	Home Age	Improvement Type	Base Annual Energy	% of Base Savings	ES Net Savings	ES Net Savings (\$/yr)	Payback (Yrs)	Net Present Value (\$)	Net Present Value (\$/yr)	ICR	Measure Description
1086	Appliances	Smart Dishwasher (NG WH)_ET	MF	N/A	NC	135.1	15%	20.0	0.057	11.0	\$395.00	\$200.00	0.07	Smart ES Qualified Dishwasher (v3.0)
1087	Appliances	ENERGY STAR Dehumidifier	MF	N/A	NC	904.6	27%	246.7	0.151	12.0	\$75.00	\$40.00	4.19	ES Qualified Dehumidifier (L/kWh = 2.2)
1088	Appliances	ENERGY STAR Freezer	MF	N/A	NC	349.5	10%	35.1	0.006	22.0	\$35.00	\$20.00	1.64	ES Qualified Freezer (10% more Efficient than NAECA)
1089	Appliances	ENERGY STAR Clothes Dryer (Electric)	MF	N/A	NC	768.9	21%	160.4	0.567	16.0	\$152.00	\$75.00	1.52	ES Qualified Dryer (CEF=3.93)
1090	Appliances	ENERGY STAR Clothes Dryer (NG)	MF	N/A	NC	123.0	21%	25.7	0.091	16.0	\$152.00	\$75.00	0.57	ES Qualified Dryer (CEF=3.93)
1091	Appliances	Smart Clothes Dryer (Electric)_ET	MF	N/A	NC	768.9	26%	202.7	0.716	16.0	\$236.00	\$120.00	1.20	Smart ES Qualified Dryer (5.5% additional energy savings)
1092	Appliances	Smart Clothes Dryer (NG)_ET	MF	N/A	NC	123.0	26%	32.4	0.115	16.0	\$236.00	\$120.00	0.45	Smart ES Qualified Dryer (5.5% additional energy savings)
1093	Appliances	Heat Pump Dryer	MF	N/A	NC	768.9	73%	558.0	1.972	12.0	\$412.00	\$205.00	1.57	Heat Pump Dryer (CEF=10.4)
1094	Appliances	ENERGY STAR Water Cooler	MF	N/A	NC	105.9	46%	48.6	0.006	10.0	\$17.00	\$10.00	2.22	ES Water Cooler (Cold Water Only)
2001	Audit	Audit Recommendations (elec) - Single-family	SF	NLI	Retrofit	19,402.4	0%	32.0	0.006	1.0	\$80.00	\$80.00	0.02	Walk through audit and recommendations for behavioral and installation measures
2002	Audit	Audit Recommendations (elec) - Single-family	SF	LI	DI	19,402.4	0%	32.0	0.006	1.0	\$80.00	\$80.00	0.02	Walk through audit and recommendations for behavioral and installation measures
2003	Audit	Audit Recommendations (elec) - Multifamily	MF	NLI	Retrofit	12,314.1	0%	32.0	0.005	1.0	\$80.00	\$80.00	0.02	Walk through audit and recommendations for behavioral and installation measures
2004	Audit	Audit Recommendations (elec) - Multifamily	MF	LI	DI	12,314.1	0%	32.0	0.005	1.0	\$80.00	\$80.00	0.02	Walk through audit and recommendations for behavioral and installation measures
2005	Audit	Audit Recommendations (elec) - Mobile	Mobile	NLI	Retrofit	19,402.4	0%	32.0	0.006	1.0	\$80.00	\$80.00	0.02	Walk through audit and recommendations for behavioral and installation measures
2006	Audit	Audit Recommendations (elec) - Mobile	Mobile	LI	DI	19,402.4	0%	32.0	0.006	1.0	\$80.00	\$80.00	0.02	Walk through audit and recommendations for behavioral and installation measures
2007	Audit	Audit Recommendations (gas) - Single-family	SF	NLI	Retrofit	9,318.6	0%	32.0	0.007	1.0	\$80.00	\$80.00	0.07	Walk through audit and recommendations for behavioral and installation measures
2008	Audit	Audit Recommendations (gas) - Single-family	SF	LI	DI	9,318.6	0%	32.0	0.007	1.0	\$80.00	\$80.00	0.07	Walk through audit and recommendations for behavioral and installation measures
2009	Audit	Audit Recommendations (gas) - Multifamily	MF	NLI	Retrofit	6,821.7	0%	32.0	0.005	1.0	\$80.00	\$80.00	0.07	Walk through audit and recommendations for behavioral and installation measures
2010	Audit	Audit Recommendations (gas) - Multifamily	MF	LI	DI	6,821.7	0%	32.0	0.005	1.0	\$80.00	\$80.00	0.07	Walk through audit and recommendations for behavioral and installation measures
2011	Audit	Audit Recommendations (gas) - Mobile	Mobile	NLI	Retrofit	9,318.6	0%	32.0	0.007	1.0	\$80.00	\$80.00	0.07	Walk through audit and recommendations for behavioral and installation measures
2012	Audit	Audit Recommendations (gas) - Mobile	Mobile	LI	DI	9,318.6	0%	32.0	0.007	1.0	\$80.00	\$80.00	0.07	Walk through audit and recommendations for behavioral and installation measures
3001	Behavioral	Home Energy Reports (Heat pump)	SF	N/A	Opt-Out	16,590.8	2%	265.5	0.049	1.0	\$7.85	\$7.90	1.68	Pre-pay billing

Vectren Electric Residential Measure Assumptions

Measure #	Behavior	Measure Name	Home Type	Income Type	Implementation Type	Base Annual Demand	% Elec Savings	Base Annual Savings	Base Annual kWh Savings	Base Annual \$ Savings	Initial Measure Cost	Installation Incentive	ROI	Measure Description
3002	Behavioral	Home Energy Reports (Electric furnace/CAC)	SF	N/A	Opt-Out	21,954.3	2%	351.3	0.051	1.0	\$7.85	\$7.90	2.13	Distribution of home energy reports encouraging adoption of energy-savings improvements
3003	Behavioral	Pre-pay (Heat pump)	SF	N/A	Opt-In	16,590.8	11%	1,825.0	0.334	3.0	\$40.00	\$0.00	3E+08	Pre-pay billing
3004	Behavioral	Pre-pay (Electric furnace/CAC)	SF	N/A	Opt-In	21,954.3	11%	2,415.0	0.353	3.0	\$40.00	\$0.00	3.E+08	Pre-pay billing
3005	Behavioral	Home Energy Management System (Heat pump)	SF	N/A	Retrofit	16,590.8	3%	532.6	0.097	5.0	\$90.00	\$45.00	2.66	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3006	Behavioral	Home Energy Management System (Electric furnace/CAC)	SF	N/A	Retrofit	21,954.3	3%	704.7	0.103	5.0	\$90.00	\$45.00	3.38	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3007	Behavioral	Home Energy Reports (Heat pump)	SF	N/A	NC	15,337.8	2%	245.4	0.036	1.0	\$7.85	\$7.90	1.55	Pre-pay billing
3008	Behavioral	Pre-pay (Heat pump)	SF	N/A	NC	15,337.8	11%	1,687.2	0.245	3.0	\$40.00	\$0.00	2.E+08	Pre-pay billing
3009	Behavioral	Home Energy Management System (Heat pump)	SF	N/A	NC	15,337.8	3%	365.0	0.044	5.0	\$90.00	\$45.00	1.75	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3010	Behavioral	Home Energy Reports (Heat pump)	MF	N/A	Opt-Out	11,369.4	2%	181.9	0.022	1.0	\$7.85	\$7.90	1.10	Pre-pay billing
3011	Behavioral	Home Energy Reports (Electric furnace/CAC)	MF	N/A	Opt-Out	13,171.6	2%	210.7	0.025	1.0	\$7.85	\$7.90	1.27	Distribution of home energy reports encouraging adoption of energy-savings improvements
3012	Behavioral	Pre-pay (Heat pump)	MF	N/A	Opt-In	11,369.4	11%	1,250.6	0.150	3.0	\$40.00	\$0.00	2.E+08	Pre-pay billing
3013	Behavioral	Pre-pay (Electric furnace/CAC)	MF	N/A	Opt-In	13,171.6	11%	1,448.9	0.169	3.0	\$40.00	\$0.00	2E+08	Pre-pay billing
3014	Behavioral	Home Energy Management System (Heat pump)	MF	N/A	Retrofit	11,369.4	3%	422.8	0.049	5.0	\$90.00	\$45.00	1.97	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3015	Behavioral	Home Energy Management System (Electric furnace/CAC)	MF	N/A	Retrofit	13,171.6	3%	492.3	0.071	5.0	\$90.00	\$45.00	2.39	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3016	Behavioral	Home Energy Reports (Heat pump)	MF	N/A	NC	10,959.2	2%	175.3	0.021	1.0	\$7.85	\$7.90	1.05	Pre-pay billing
3017	Behavioral	Pre-pay (Heat pump)	MF	N/A	NC	10,959.2	11%	1,205.5	0.146	3.0	\$40.00	\$0.00	2E+08	Pre-pay billing
3018	Behavioral	Home Energy Management System (Heat pump)	MF	N/A	NC	10,959.2	3%	351.8	0.043	5.0	\$90.00	\$45.00	1.67	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3019	Behavioral	Home Energy Reports (Gas furnace/CAC)	SF	N/A	Opt-Out	9,318.6	1%	121.1	0.045	1.0	\$7.85	\$7.90	1.48	Distribution of home energy reports encouraging adoption of energy-savings improvements
3020	Behavioral	Pre-pay (Gas furnace/CAC)	SF	N/A	Opt-In	9,318.6	11%	1,025.0	0.377	3.0	\$40.00	\$0.00	3.E+08	Pre-pay billing
3021	Behavioral	Home Energy Management System (Gas furnace/CAC)	SF	N/A	Retrofit	9,318.6	3%	299.1	0.110	5.0	\$90.00	\$45.00	2.98	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3022	Behavioral	Home Energy Reports (Gas furnace/CAC)	SF	N/A	NC	8,582.1	1%	111.6	0.032	1.0	\$7.85	\$7.90	1.09	Distribution of home energy reports encouraging adoption of energy-savings improvements
3023	Behavioral	Pre-pay (Gas furnace/CAC)	SF	N/A	NC	8,582.1	11%	944.0	0.269	3.0	\$40.00	\$0.00	2E+08	Pre-pay billing
3024	Behavioral	Home Energy Management System (Gas furnace/CAC)	SF	N/A	NC	8,582.1	3%	275.5	0.078	5.0	\$90.00	\$45.00	2.18	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home

Vectren Electric		Residential Measure Assumptions												
Measure #	Eq. Desc.	Activity Name	Home Energy Reports	Home Energy Reports	Replacement Type	Base Cost	% Save	Pay Back Period (Yrs)	Annual Savings (\$/Yr)	Energy Payback (Yrs)	Net Cost	Historical Measure	Rel. C.	Measure Description
3025	Behavioral	Home Energy Reports (Gas furnace/CAC)	MF	N/A	Opt-Out	6,821.7	1%	88.7	0.022	1.0	\$7.85	\$7.90	0.91	Distribution of home energy reports encouraging adoption of energy-savings improvements
3026	Behavioral	Pre-pay (Gas furnace/CAC)	MF	N/A	Opt-In	6,821.7	11%	750.4	0.183	3.0	\$40.00	\$0.00	2E+08	Pre-pay billing
3027	Behavioral	Home Energy Management System (Gas furnace/CAC)	MF	N/A	Retrofit	6,821.7	3%	219.0	0.053	5.0	\$90.00	\$45.00	1.82	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
3028	Behavioral	Home Energy Reports (Gas furnace/CAC)	MF	N/A	NC	10,165.2	1%	132.1	0.021	1.0	\$7.85	\$7.90	0.96	Distribution of home energy reports encouraging adoption of energy-savings improvements
3029	Behavioral	Pre-pay (Gas furnace/CAC)	MF	N/A	NC	10,165.2	11%	1,118.2	0.180	8.0	\$40.00	\$0.00	3E+08	Pre-pay billing
3030	Behavioral	Home Energy Management System (Gas furnace/CAC)	MF	N/A	NC	10,165.2	3%	326.3	0.053	5.0	\$90.00	\$45.00	1.90	HEMS are hardware and software systems that can control and monitor one or more energy uses in the home
4001	HVAC Equipment	ASHP Tune Up	SF	NLI	Retrofit	6,321.2	5%	316.1	0.152	5.0	\$64.00	\$64.00	1.53	Air source heat pump tune up
4002	HVAC Equipment	Air Source Heat Pump 16 SEER - Heat pump baseline	SF	NLI	MO	6,321.2	9%	566.2	0.612	18.0	\$870.00	\$300.00	2.47	16 SEER 9.0 hspf air source heat pump
4003	HVAC Equipment	Air Source Heat Pump 16 SEER - Furnace baseline	SF	NLI	MO	11,684.8	51%	5,929.7	0.922	18.0	\$2,121.00	\$300.00	13.12	16 SEER 9.0 hspf air source heat pump
4004	HVAC Equipment	AC Tune Up	SF	NLI	Retrofit	2,713.0	5%	135.6	0.161	5.0	\$64.00	\$64.00	1.11	Central air conditioner tune-up
4005	HVAC Equipment	Central Air Conditioner 16 SEER	SF	NLI	MO	2,713.0	18%	483.4	0.508	18.0	\$400.00	\$200.00	3.41	16 SEER central air conditioner
4006	HVAC Equipment	Smart Thermostat - Heat pump baseline	SF	NLI	Retrofit	6,321.2	10%	658.6	0.000	15.0	\$154.00	\$60.00	5.26	Smart thermostat
4007	HVAC Equipment	WiFi Thermostat - Heat pump baseline	SF	NLI	Retrofit	6,321.2	6%	377.8	0.000	15.0	\$103.20	\$50.00	3.62	Wifi (non-smart) thermostat
4008	HVAC Equipment	Smart Thermostat - Furnace baseline	SF	NLI	Retrofit	11,684.8	11%	1,239.0	0.000	15.0	\$154.00	\$60.00	9.89	Smart thermostat
4009	HVAC Equipment	WiFi Thermostat - Furnace baseline	SF	NLI	Retrofit	11,684.8	5%	568.0	0.000	15.0	\$103.20	\$50.00	5.44	Wifi (non-smart) thermostat
4010	HVAC Equipment	Filter Whistle	SF	NLI	Retrofit	9,132.9	4%	319.7	0.109	15.0	\$1.64	\$1.64	139.02	Whistle to remind owners to change air filter
4011	HVAC Equipment	ASHP Tune Up	SF	LI	DI	6,321.2	5%	316.1	0.152	5.0	\$64.00	\$64.00	1.53	Air source heat pump tune up
4012	HVAC Equipment	Air Source Heat Pump 16 SEER - Heat pump baseline	SF	LI	DI	6,321.2	9%	566.2	0.612	18.0	\$5,400.00	\$5,400.00	0.14	16 SEER 9.0 hspf air source heat pump
4013	HVAC Equipment	Air Source Heat Pump 16 SEER - Furnace baseline	SF	LI	DI	11,684.8	51%	5,929.7	0.922	18.0	\$5,400.00	\$5,400.00	0.73	16 SEER 9.0 hspf air source heat pump
4014	HVAC Equipment	AC Tune Up	SF	LI	DI	2,713.0	5%	135.6	0.161	5.0	\$64.00	\$64.00	1.11	Central air conditioner tune-up
4015	HVAC Equipment	Central Air Conditioner 16 SEER	SF	LI	DI	2,713.0	18%	483.4	0.508	18.0	\$3,500.00	\$3,500.00	0.20	16 SEER central air conditioner
4016	HVAC Equipment	Smart Thermostat - Heat pump baseline	SF	LI	DI	6,321.2	10%	658.6	0.000	15.0	\$154.00	\$154.00	2.05	Smart thermostat
4017	HVAC Equipment	WiFi Thermostat - Heat pump baseline	SF	LI	DI	6,321.2	6%	377.8	0.000	15.0	\$103.20	\$103.20	1.75	Wifi (non-smart) thermostat
4018	HVAC Equipment	Smart Thermostat - Furnace baseline	SF	LI	DI	11,684.8	11%	1,239.0	0.000	15.0	\$154.00	\$154.00	3.85	Smart thermostat
4019	HVAC Equipment	WiFi Thermostat - Furnace baseline	SF	LI	DI	11,684.8	5%	568.0	0.000	15.0	\$103.20	\$103.20	2.64	Wifi (non-smart) thermostat
4020	HVAC Equipment	Filter Whistle	SF	LI	DI	9,132.9	4%	319.7	0.109	15.0	\$1.64	\$1.64	139.02	Whistle to remind owners to change air filter

Vectren Electric		Residential Measure Assumptions													
Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Area (sqft)	% Savings	Energy Savings (kWh/yr)	Peak Demand (kW)	Cost (\$)	Net Cost (\$)	Payback (yr)	SEER	Measure Description	
4021	HVAC Equipment	Air Source Heat Pump 18 SEER - Heat pump baseline	SF	NLI	MO	6,321.2	17%	1,058.6	0.770	18.0	\$1,156.00	\$500.00	2.33	18 SEER air source heat pump	
4022	HVAC Equipment	Ductless Heat Pump 17 SEER 9.5 HSPF - Heat pump baseline	SF	NLI	MO	6,321.2	6%	349.5	2.740	18.0	\$1,666.67	\$500.00	4.51	17 SEER / 9.5 hspf ductless heat pump	
4023	HVAC Equipment	Ductless Heat Pump 19 SEER 9.5 HSPF - Heat pump baseline	SF	NLI	MO	6,321.2	7%	427.5	2.650	18.0	\$2,333.33	\$500.00	4.46	19 SEER / 9.5 hspf ductless heat pump	
4024	HVAC Equipment	Ductless Heat Pump 21 SEER 10.0 HSPF - Heat pump baseline	SF	NLI	MO	6,321.2	8%	523.0	2.589	18.0	\$2,833.33	\$500.00	4.47	21 SEER / 10.0 hspf ductless heat pump	
4025	HVAC Equipment	Ductless Heat Pump 23 SEER 10.0 HSPF - Heat pump baseline	SF	NLI	MO	6,321.2	9%	575.2	2.542	18.0	\$3,333.33	\$500.00	4.46	23 SEER / 10.0 hspf ductless heat pump	
4026	HVAC Equipment	Dual Fuel Air Source Heat Pump 16 SEER - Heat pump baseline	SF	NLI	MO	6,321.2	45%	2,871.9	0.612	18.0	\$1,000.00	\$300.00	2.24	16 SEER Dual-fuel heat pump	
4027	HVAC Equipment	Dual Fuel Air Source Heat Pump 18 SEER - Heat pump baseline	SF	NLI	MO	6,321.2	50%	3,171.0	0.770	18.0	\$1,286.00	\$500.00	1.97	18 SEER Dual-fuel heat pump	
4028	HVAC Equipment	Ground Source Heat Pump - Heat pump baseline	SF	NLI	MO	6,321.2	8%	491.2	-0.213	18.0	\$3,609.00	\$1,000.00	0.12	Geothermal heat pump	
4029	HVAC Equipment	Air Source Heat Pump 18 SEER - Furnace baseline	SF	NLI	MO	11,684.8	55%	6,422.1	1.059	18.0	\$2,407.00	\$500.00	8.71	18 SEER air source heat pump	
4030	HVAC Equipment	Ductless Heat Pump 17 SEER 9.5 HSPF - Furnace baseline	SF	NLI	MO	11,684.8	26%	2,988.6	2.915	18.0	\$1,666.67	\$500.00	7.85	17 SEER / 9.5 hspf ductless heat pump	
4031	HVAC Equipment	Ductless Heat Pump 19 SEER 9.5 HSPF - Furnace baseline	SF	NLI	MO	11,684.8	26%	3,066.6	2.825	18.0	\$2,333.33	\$500.00	7.80	19 SEER / 9.5 hspf ductless heat pump	
4032	HVAC Equipment	Ductless Heat Pump 21 SEER 10.0 HSPF - Furnace baseline	SF	NLI	MO	11,684.8	27%	3,207.2	2.765	18.0	\$2,833.33	\$500.00	7.86	21 SEER / 10.0 hspf ductless heat pump	
4033	HVAC Equipment	Ductless Heat Pump 23 SEER 10.0 HSPF - Furnace baseline	SF	NLI	MO	11,684.8	28%	3,259.3	2.718	18.0	\$3,333.33	\$500.00	7.85	23 SEER / 10.0 hspf ductless heat pump	
4034	HVAC Equipment	Dual Fuel Air Source Heat Pump 16 SEER - Furnace baseline	SF	NLI	MO	11,684.8	70%	8,235.5	0.922	18.0	\$2,848.00	\$300.00	12.88	16 SEER Dual-fuel heat pump	
4035	HVAC Equipment	Dual Fuel Air Source Heat Pump 18 SEER - Furnace baseline	SF	NLI	MO	11,684.8	73%	8,534.6	1.059	18.0	\$3,134.00	\$500.00	8.36	18 SEER Dual-fuel heat pump	
4036	HVAC Equipment	Ground Source Heat Pump - Furnace baseline	SF	NLI	MO	11,684.8	50%	6,854.7	0.082	18.0	\$3,609.00	\$1,000.00	3.31	Geothermal heat pump	
4037	HVAC Equipment	Central Air Conditioner 18 SEER	SF	NLI	MO	2,713.0	30%	823.3	0.950	18.0	\$800.00	\$400.00	2.97	18 SEER central air conditioner	
4038	HVAC Equipment	ECM HVAC Motor	SF	NLI	Retrofit	9,132.9	5%	412.0	0.000	10.0	\$97.00	\$50.00	2.73	Electrically commutated motor	
4039	HVAC Equipment	ENERGY STAR Room Air Conditioner	SF	N/A	MO	489.9	10%	49.0	0.110	9.0	\$40.00	\$10.00	4.83	ENERGY STAR Room Air Conditioner in place of standard efficiency alternative	
4040	HVAC Equipment	Smart Room AC_ET	SF	N/A	MO	489.9	3%	14.7	0.033	9.0	\$205.00	\$60.00	0.24	Window-mounted AC unit with smart capability	
4041	HVAC Equipment	Smart Room AC - controls retrofit_ET	SF	N/A	Retrofit	489.9	3%	14.7	0.033	9.0	\$110.00	\$30.00	0.48	Smart control retrofit kit	
4042	HVAC Equipment	Room Air Conditioner Recycling	SF	N/A	Recycle	656.3	100%	656.3	1.475	3.0	\$129.00	\$40.00	6.17	Recycling of tertiary room air conditioner	
4043	HVAC Equipment	Programmable Thermostat - Heat pump baseline	SF	N/A	Retrofit	6,321.2	4%	229.0	0.000	15.0	\$35.00	\$10.00	10.97	Programmable thermostat	
4044	HVAC Equipment	Programmable Thermostat - Furnace baseline	SF	N/A	Retrofit	11,684.8	3%	354.8	0.000	15.0	\$35.00	\$10.00	16.99	Programmable thermostat	

Vectren Electric Residential Measure Assumptions

Measure #	Equipment	Measure Name	Room	Measure Type	Replacement Type	Base Annual Energy Cost (\$)	% Savings	Net Annual Energy Cost (\$)	Net Annual Savings (\$)	Payback (Years)	Net Present Value (\$)	Net Present Value (\$)	NPV (\$)	Measure Description
4045	HVAC Equipment	Smart Vents/Sensors_ET	SF	N/A	Retrofit	9,132.9	10%	913.3	0.313	15.0	\$800.00	\$400.00	1.63	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home
4046	HVAC Equipment	Smart Ceiling Fan_ET	SF	N/A	Retrofit	2,643.1	8%	198.2	0.235	20.0	\$2,400.00	\$1,000.00	0.31	Smart ceiling fans save energy by turning off when rooms are unoccupied and by helping the home's central HVAC maintain indoor comfort
4047	HVAC Equipment	Whole House Attic Fan	SF	N/A	Retrofit	2,643.1	13%	338.0	0.000	20.0	\$546.60	\$275.00	0.74	Whole house attic fan
4048	HVAC Equipment	Attic Fan	SF	N/A	Retrofit	2,643.1	10%	264.3	0.000	20.0	\$120.48	\$40.00	3.96	Attic fans can reduce the need for AC by reducing heat transfer from the attic through the ceiling of the house
4049	HVAC Equipment	Air Source Heat Pump 16 SEER - Heat pump baseline	SF	N/A	NC	4,984.5	8%	419.9	0.405	18.0	\$870.00	\$300.00	1.97	16 SEER 9.0 hspf air source heat pump
4050	HVAC Equipment	Air Source Heat Pump 18 SEER - Heat pump baseline	SF	N/A	NC	4,984.5	17%	825.1	0.576	18.0	\$1,156.00	\$500.00	1.92	18 SEER air source heat pump
4051	HVAC Equipment	Ductless Heat Pump 17 SEER 9.5 HSPF - Heat pump baseline	SF	N/A	NC	4,984.5	6%	319.4	1.931	18.0	\$1,666.67	\$500.00	3.57	17 SEER / 9.5 hspf ductless heat pump
4052	HVAC Equipment	Ductless Heat Pump 19 SEER 9.5 HSPF - Heat pump baseline	SF	N/A	NC	4,984.5	8%	397.4	1.841	18.0	\$2,333.33	\$500.00	3.51	19 SEER / 9.5 hspf ductless heat pump
4053	HVAC Equipment	Ductless Heat Pump 21 SEER 10.0 HSPF - Heat pump baseline	SF	N/A	NC	4,984.5	10%	485.0	1.780	18.0	\$2,833.33	\$500.00	3.51	21 SEER / 10.0 hspf ductless heat pump
4054	HVAC Equipment	Ductless Heat Pump 23 SEER 10.0 HSPF - Heat pump baseline	SF	N/A	NC	4,984.5	11%	537.1	1.733	18.0	\$3,333.33	\$500.00	3.48	23 SEER / 10.0 hspf ductless heat pump
4055	HVAC Equipment	Dual Fuel Air Source Heat Pump 16 SEER - Heat pump baseline	SF	N/A	NC	4,984.5	36%	1,797.4	0.405	18.0	\$1,000.00	\$300.00	2.09	16 SEER Dual-fuel heat pump
4056	HVAC Equipment	Dual Fuel Air Source Heat Pump 18 SEER - Heat pump baseline	SF	N/A	NC	4,984.5	42%	2,083.8	0.576	18.0	\$1,288.00	\$500.00	1.86	18 SEER Dual-fuel heat pump
4057	HVAC Equipment	Ground Source Heat Pump - Heat pump baseline	SF	N/A	NC	4,984.5	7%	368.9	-0.084	18.0	\$3,609.00	\$1,000.00	0.14	Geothermal heat pump
4058	HVAC Equipment	Central Air Conditioner 16 SEER	SF	N/A	NC	2,364.4	18%	432.6	0.429	18.0	\$400.00	\$200.00	3.06	16 SEER central air conditioner
4059	HVAC Equipment	Central Air Conditioner 18 SEER	SF	N/A	NC	2,364.4	30%	711.3	0.716	18.0	\$800.00	\$400.00	2.57	18 SEER central air conditioner
4060	HVAC Equipment	ENERGY STAR Room Air Conditioner	SF	N/A	NC	489.9	10%	49.0	0.110	9.0	\$40.00	\$10.00	4.83	ENERGY STAR Room Air Conditioner in place of standard efficiency alternative
4061	HVAC Equipment	Smart Room AC_ET	SF	N/A	NC	489.9	3%	14.7	0.033	9.0	\$205.00	\$60.00	0.24	Window-mounted AC unit with smart capability
4062	HVAC Equipment	Programmable Thermostat - Heat pump baseline	SF	N/A	NC	4,984.5	4%	185.1	0.000	15.0	\$35.00	\$10.00	8.87	Programmable thermostat
4063	HVAC Equipment	Smart Thermostat - Heat pump baseline	SF	N/A	NC	4,984.5	10%	517.9	0.000	15.0	\$154.00	\$60.00	4.14	Smart thermostat
4064	HVAC Equipment	WiFi Thermostat - Heat pump baseline	SF	N/A	NC	4,984.5	6%	306.6	0.000	15.0	\$103.20	\$50.00	2.94	Wifi (non-smart) thermostat
4065	HVAC Equipment	Filter Whistle	SF	N/A	NC	4,984.5	4%	174.5	0.078	15.0	\$1.64	\$1.64	86.34	Whistle to remind owners to change air filter

Vectren Electric Residential Measure Assumptions

Measure ID	Equipment	Measure Name	Measure Type	Measure Category	Measure Status	Base Measure	Base Measure %	Base Measure Cost	Base Measure kWh	Base Measure kWh/yr	Measure Cost	Measure kWh	Measure kWh/yr	Measure Description
4066	HVAC Equipment	Smart Vents/Sensors_ET	SF	N/A	NC	4,984.5	10%	498.4	0.223	15.0	\$800.00	\$400.00	1.01	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home
4067	HVAC Equipment	ASHP Tune Up	MF	NLI	Retrofit	3,171.0	5%	158.5	0.068	5.0	\$64.00	\$64.00	0.82	Air source heat pump tune up
4068	HVAC Equipment	Air Source Heat Pump 16 SEER - Heat pump baseline	MF	NLI	MO	3,171.0	7%	217.1	0.182	18.0	\$870.00	\$300.00	0.90	16 SEER 9.0 hspf air source heat pump
4069	HVAC Equipment	Air Source Heat Pump 16 SEER - Furnace baseline	MF	NLI	MO	4,973.1	41%	2,019.3	0.391	18.0	\$2,121.00	\$300.00	4.80	16 SEER 9.0 hspf air source heat pump
4070	HVAC Equipment	AC Tune Up	MF	NLI	Retrofit	2,017.5	5%	100.9	0.077	5.0	\$64.00	\$64.00	0.71	Central air conditioner tune-up
4071	HVAC Equipment	Central Air Conditioner 16 SEER	MF	NLI	MO	2,017.5	19%	382.4	0.259	18.0	\$400.00	\$200.00	2.30	16 SEER central air conditioner
4072	HVAC Equipment	Smart Thermostat - Heat pump baseline	MF	NLI	Retrofit	3,171.0	10%	324.3	0.000	15.0	\$154.00	\$60.00	2.59	Smart thermostat
4073	HVAC Equipment	WiFi Thermostat - Heat pump baseline	MF	NLI	Retrofit	3,171.0	7%	226.4	0.000	15.0	\$103.20	\$50.00	2.17	Wifi (non-smart) thermostat
4074	HVAC Equipment	Smart Thermostat - Furnace baseline	MF	NLI	Retrofit	4,973.1	10%	518.2	0.000	15.0	\$154.00	\$60.00	4.14	Smart thermostat
4075	HVAC Equipment	WiFi Thermostat - Furnace baseline	MF	NLI	Retrofit	4,973.1	6%	297.1	0.000	15.0	\$103.20	\$50.00	2.85	Wifi (non-smart) thermostat
4076	HVAC Equipment	Filter Whistle	MF	NLI	Retrofit	4,115.7	4%	144.0	0.051	15.0	\$1.64	\$1.64	68.64	Whistle to remind owners to change air filter
4077	HVAC Equipment	ASHP Tune Up	MF	LI	DI	3,171.0	5%	158.5	0.068	5.0	\$64.00	\$64.00	0.82	Air source heat pump tune up
4078	HVAC Equipment	Air Source Heat Pump 16 SEER - Heat pump baseline	MF	LI	DI	3,171.0	7%	217.1	0.182	18.0	\$5,400.00	\$5,400.00	0.05	16 SEER 9.0 hspf air source heat pump
4079	HVAC Equipment	Air Source Heat Pump 16 SEER - Furnace baseline	MF	LI	DI	4,973.1	41%	2,019.3	0.391	18.0	\$5,400.00	\$5,400.00	0.27	16 SEER 9.0 hspf air source heat pump
4080	HVAC Equipment	AC Tune Up	MF	LI	DI	2,017.5	5%	100.9	0.077	5.0	\$64.00	\$64.00	0.71	Central air conditioner tune-up
4081	HVAC Equipment	Central Air Conditioner 16 SEER	MF	LI	DI	2,017.5	19%	382.4	0.259	18.0	\$3,500.00	\$3,500.00	0.13	16 SEER central air conditioner
4082	HVAC Equipment	Smart Thermostat - Heat pump baseline	MF	LI	DI	3,171.0	10%	324.3	0.000	15.0	\$154.00	\$154.00	1.01	Smart thermostat
4083	HVAC Equipment	WiFi Thermostat - Heat pump baseline	MF	LI	DI	3,171.0	7%	226.4	0.000	15.0	\$103.20	\$103.20	1.05	Wifi (non-smart) thermostat
4084	HVAC Equipment	Smart Thermostat - Furnace baseline	MF	LI	DI	4,973.1	10%	518.2	0.000	15.0	\$154.00	\$154.00	1.61	Smart thermostat
4085	HVAC Equipment	WiFi Thermostat - Furnace baseline	MF	LI	DI	4,973.1	6%	297.1	0.000	15.0	\$103.20	\$103.20	1.38	Wifi (non-smart) thermostat
4086	HVAC Equipment	Filter Whistle	MF	LI	DI	4,115.7	4%	144.0	0.051	15.0	\$1.64	\$1.64	68.64	Whistle to remind owners to change air filter
4087	HVAC Equipment	Air Source Heat Pump 18 SEER - Heat pump baseline	MF	NLI	MO	3,171.0	16%	500.3	0.330	18.0	\$1,156.00	\$500.00	1.10	18 SEER air source heat pump
4088	HVAC Equipment	Ductless Heat Pump 17 SEER 9.5 HSPF - Heat pump baseline	MF	NLI	MO	3,171.0	9%	270.4	1.065	18.0	\$1,666.67	\$500.00	2.34	17 SEER / 9.5 hspf ductless heat pump
4089	HVAC Equipment	Ductless Heat Pump 19 SEER 9.5 HSPF - Heat pump baseline	MF	NLI	MO	3,171.0	11%	348.4	0.975	18.0	\$2,333.33	\$500.00	2.25	19 SEER / 9.5 hspf ductless heat pump
4090	HVAC Equipment	Ductless Heat Pump 21 SEER 10.0 HSPF - Heat pump baseline	MF	NLI	MO	3,171.0	13%	422.8	0.914	18.0	\$2,833.33	\$500.00	2.22	21 SEER / 10.0 hspf ductless heat pump

Vectren Electric Residential Measure Assumptions

Measure #	Measure Name	Measure Description	Home Type	Measure Type	Replacement Type	Base Cost	% Rebate	Net Cost	Summer kWh	Winter kWh	Utility Measure Cost	Net Measure Cost	ICC	Measure Assumption
4091	HVAC Equipment	Ductless Heat Pump 23 SEER 10.0 HSPF - Heat pump baseline	MF	NLI	MO	3,171.0	15%	475.0	0.867	18.0	\$3,333.33	\$500.00	2.10	23 SEER / 10.0 hspf ductless heat pump
4092	HVAC Equipment	Dual Fuel Air Source Heat Pump 16 SEER - Heat pump baseline	MF	NLI	MO	3,171.0	29%	918.5	0.182	18.0	\$1,000.00	\$300.00	0.82	16 SEER Dual-fuel heat pump
4093	HVAC Equipment	Dual Fuel Air Source Heat Pump 18 SEER - Heat pump baseline	MF	NLI	MO	3,171.0	36%	1,141.1	0.330	18.0	\$1,286.00	\$500.00	0.99	18 SEER Dual-fuel heat pump
4094	HVAC Equipment	Air Source Heat Pump 18 SEER - Furnace baseline	MF	NLI	MO	4,973.1	46%	2,302.4	0.535	18.0	\$2,407.00	\$500.00	3.45	18 SEER air source heat pump
4095	HVAC Equipment	Ductless Heat Pump 17 SEER 9.5 HSPF - Furnace baseline	MF	NLI	MO	4,973.1	23%	1,137.5	1.242	18.0	\$1,666.67	\$500.00	3.64	17 SEER / 9.5 hspf ductless heat pump
4096	HVAC Equipment	Ductless Heat Pump 19 SEER 9.5 HSPF - Furnace baseline	MF	NLI	MO	4,973.1	24%	1,215.5	1.152	18.0	\$2,333.33	\$500.00	3.56	19 SEER / 9.5 hspf ductless heat pump
4097	HVAC Equipment	Ductless Heat Pump 21 SEER 10.0 HSPF - Furnace baseline	MF	NLI	MO	4,973.1	26%	1,304.1	1.091	18.0	\$2,833.33	\$500.00	3.54	21 SEER / 10.0 hspf ductless heat pump
4098	HVAC Equipment	Ductless Heat Pump 23 SEER 10.0 HSPF - Furnace baseline	MF	NLI	MO	4,973.1	27%	1,356.3	1.044	18.0	\$3,333.33	\$500.00	3.51	23 SEER / 10.0 hspf ductless heat pump
4099	HVAC Equipment	Dual Fuel Air Source Heat Pump 16 SEER - Furnace baseline	MF	NLI	MO	4,973.1	55%	2,720.7	0.391	18.0	\$2,848.00	\$300.00	4.72	16 SEER Dual-fuel heat pump
4100	HVAC Equipment	Dual Fuel Air Source Heat Pump 18 SEER - Furnace baseline	MF	NLI	MO	4,973.1	59%	2,943.3	0.535	18.0	\$3,134.00	\$500.00	3.33	18 SEER Dual-fuel heat pump
4101	HVAC Equipment	Central Air Conditioner 18 SEER	MF	NLI	MO	2,017.5	31%	631.3	0.470	18.0	\$800.00	\$400.00	1.91	18 SEER central air conditioner
4102	HVAC Equipment	ECM HVAC Motor	MF	NLI	Retrofit	4,115.7	10%	412.0	0.000	10.0	\$97.00	\$50.00	2.73	Electrically commutated motor
4103	HVAC Equipment	ENERGY STAR Room Air Conditioner	MF	N/A	MO	489.9	10%	49.0	0.110	9.0	\$40.00	\$10.00	4.83	ENERGY STAR Room Air Conditioner in place of standard efficiency alternative
4104	HVAC Equipment	Smart Room AC_ET	MF	N/A	MO	489.9	3%	14.7	0.033	9.0	\$205.00	\$60.00	0.24	Window-mounted AC unit with smart capability
4105	HVAC Equipment	Smart Room AC - controls retrofit_ET	MF	N/A	Retrofit	489.9	3%	14.7	0.033	9.0	\$110.00	\$30.00	0.48	Smart control retrofit kit
4106	HVAC Equipment	Room Air Conditioner Recycling	MF	N/A	Recycle	656.3	100%	656.3	1.475	3.0	\$129.00	\$40.00	6.17	Recycling of tertiary room air conditioner
4107	HVAC Equipment	Programmable Thermostat - Heat pump baseline	MF	N/A	Retrofit	3,171.0	4%	134.3	0.000	15.0	\$35.00	\$10.00	6.43	Programmable thermostat
4108	HVAC Equipment	Programmable Thermostat - Furnace baseline	MF	N/A	Retrofit	4,973.1	4%	180.1	0.000	15.0	\$35.00	\$10.00	8.63	Programmable thermostat
4109	HVAC Equipment	Smart Vents/Sensors_ET	MF	N/A	Retrofit	4,115.7	10%	411.6	0.145	15.0	\$800.00	\$400.00	0.80	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home
4110	HVAC Equipment	Smart Ceiling Fan_ET	MF	N/A	Retrofit	1,943.4	7%	145.8	0.109	20.0	\$2,400.00	\$1,000.00	0.20	Smart ceiling fans save energy by turning off when rooms are unoccupied and by helping the home's central HVAC maintain indoor comfort
4111	HVAC Equipment	Whole House Attic Fan	MF	N/A	Retrofit	1,943.4	17%	338.0	0.000	20.0	\$546.60	\$275.00	0.74	Whole house attic fan
4112	HVAC Equipment	Attic Fan	MF	N/A	Retrofit	1,943.4	10%	194.3	0.000	20.0	\$120.48	\$40.00	2.91	Attic fans can reduce the need for AC by reducing heat transfer from the attic through the ceiling of the house

Vectren Electric Residential Measure Assumptions

Measure #	Equipment	Measure Name	Time	Measure Type	Replacement Type	Base Annual Energy Cost (\$)	% Savings	Base Annual Savings (\$)	SEER/EER	SEER/EER	Initial Measure Cost (\$)	Annual Measure Cost (\$)	ICR	Measure Description
4113	HVAC Equipment	Air Source Heat Pump 16 SEER - Heat pump baseline	MF	N/A	NC	2,870.1	6%	185.4	0.185	18.0	\$870.00	\$300.00	0.81	16 SEER 9.0 hspf air source heat pump
4114	HVAC Equipment	Air Source Heat Pump 18 SEER - Heat pump baseline	MF	N/A	NC	2,870.1	16%	445.7	0.329	18.0	\$1,156.00	\$500.00	1.00	18 SEER air source heat pump
4115	HVAC Equipment	Ductless Heat Pump 17 SEER 9.5 HSPF - Heat pump baseline	MF	N/A	NC	2,870.1	9%	265.3	1.031	18.0	\$1,666.67	\$500.00	2.12	17 SEER / 9.5 hspf ductless heat pump
4116	HVAC Equipment	Ductless Heat Pump 19 SEER 9.5 HSPF - Heat pump baseline	MF	N/A	NC	2,870.1	12%	343.3	0.941	18.0	\$2,333.33	\$500.00	2.04	19 SEER / 9.5 hspf ductless heat pump
4117	HVAC Equipment	Ductless Heat Pump 21 SEER 10.0 HSPF - Heat pump baseline	MF	N/A	NC	2,870.1	15%	416.4	0.880	18.0	\$2,833.33	\$500.00	2.02	21 SEER / 10.0 hspf ductless heat pump
4118	HVAC Equipment	Ductless Heat Pump 23 SEER 10.0 HSPF - Heat pump baseline	MF	N/A	NC	2,870.1	16%	468.6	0.833	18.0	\$3,333.33	\$500.00	1.99	23 SEER / 10.0 hspf ductless heat pump
4119	HVAC Equipment	Dual Fuel Air Source Heat Pump 16 SEER - Heat pump baseline	MF	N/A	NC	2,870.1	28%	815.1	0.185	18.0	\$1,000.00	\$300.00	0.73	16 SEER Dual-fuel heat pump
4120	HVAC Equipment	Dual Fuel Air Source Heat Pump 18 SEER - Heat pump baseline	MF	N/A	NC	2,870.1	36%	1,020.9	0.329	18.0	\$1,286.00	\$500.00	0.89	18 SEER Dual-fuel heat pump
4121	HVAC Equipment	Central Air Conditioner 16 SEER	MF	N/A	NC	1,897.8	20%	378.3	0.295	18.0	\$400.00	\$200.00	2.36	16 SEER central air conditioner
4122	HVAC Equipment	Central Air Conditioner 18 SEER	MF	N/A	NC	1,897.8	32%	602.1	0.498	18.0	\$800.00	\$400.00	1.87	18 SEER central air conditioner
4123	HVAC Equipment	ENERGY STAR Room Air Conditioner	MF	N/A	NC	489.9	10%	49.0	0.110	9.0	\$40.00	\$10.00	4.83	ENERGY STAR Room Air Conditioner in place of standard efficiency alternative
4124	HVAC Equipment	Smart Room AC_ET	MF	N/A	NC	489.9	3%	14.7	0.033	9.0	\$205.00	\$60.00	0.24	Window-mounted AC unit with smart capability
4125	HVAC Equipment	Programmable Thermostat - Heat pump baseline	MF	N/A	NC	2,870.1	4%	122.7	0.000	15.0	\$35.00	\$10.00	5.88	Programmable thermostat
4126	HVAC Equipment	Smart Thermostat - Heat pump baseline	MF	N/A	NC	2,870.1	10%	293.2	0.000	15.0	\$154.00	\$60.00	2.34	Smart thermostat
4127	HVAC Equipment	WiFi Thermostat - Heat pump baseline	MF	N/A	NC	2,870.1	7%	207.0	0.000	15.0	\$103.20	\$50.00	1.98	Wifi (non-smart) thermostat
4128	HVAC Equipment	Filter Whistle	MF	N/A	NC	2,870.1	4%	100.5	0.046	15.0	\$1.64	\$1.64	51.70	Whistle to remind owners to change air filter
4129	HVAC Equipment	Smart Vents/Sensors_ET	MF	N/A	NC	2,870.1	10%	287.0	0.133	15.0	\$800.00	\$400.00	0.61	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home
4130	HVAC Equipment	Smart Thermostat - Gas / CAC	SF	NLI	Retrofit	2,939.6	10%	292.7	0.000	15.0	\$154.00	\$60.00	7.41	Smart thermostat
4131	HVAC Equipment	WiFi Thermostat - Gas / CAC	SF	NLI	Retrofit	2,939.6	9%	258.0	0.000	15.0	\$103.20	\$50.00	4.36	Wifi (non-smart) thermostat
4132	HVAC Equipment	Filter Whistle	SF	NLI	Retrofit	2,939.6	3%	95.2	0.120	15.0	\$1.64	\$1.64	105.83	Whistle to remind owners to change air filter
4133	HVAC Equipment	Smart Thermostat - Gas / CAC	SF	LI	DI	2,939.6	10%	292.7	0.000	15.0	\$154.00	\$154.00	2.89	Smart thermostat
4134	HVAC Equipment	WiFi Thermostat - Gas / CAC	SF	LI	DI	2,939.6	9%	258.0	0.000	15.0	\$103.20	\$103.20	2.11	Wifi (non-smart) thermostat
4135	HVAC Equipment	Filter Whistle	SF	LI	DI	2,939.6	3%	95.2	0.120	15.0	\$1.64	\$1.64	105.83	Whistle to remind owners to change air filter
4136	HVAC Equipment	Programmable Thermostat - Gas / CAC	SF	N/A	Retrofit	2,939.6	5%	149.8	0.000	15.0	\$35.00	\$10.00	13.49	Programmable thermostat

Vectren Electric Residential Measure Assumptions

Measure #	Equipment	Measure/Device	Unit Type	Measure Type	Replacement Type	Base Cost (\$)	% Savings	Pay Back (\$)	Pay Back (Yrs)	Base Load (kW)	Base Load (kW)	Measure Cost (\$)	Measure Cost (\$)	Base Load (kW)	Measure Description
4137	HVAC Equipment	Smart Vents/Sensors_ET	SF	N/A	Retrofit	2,939.6	10%	294.0	0.343	15.0	\$800.00	\$400.00	1.60	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home	
4138	HVAC Equipment	Programmable Thermostat - Gas / CAC	SF	N/A	NC	2,479.3	5%	129.5	0.000	18.0	\$35.00	\$10.00	11.87	Programmable thermostat	
4139	HVAC Equipment	Smart Thermostat - Gas / CAC	SF	N/A	NC	2,479.3	10%	245.9	0.000	15.0	\$154.00	\$60.00	5.28	Smart thermostat	
4140	HVAC Equipment	WiFi Thermostat - Gas / CAC	SF	N/A	NC	2,479.3	9%	223.6	0.000	15.0	\$103.20	\$50.00	3.38	Wifi (non-smart) thermostat	
4141	HVAC Equipment	Filter Whistle	SF	N/A	NC	2,479.3	3%	81.9	0.107	15.0	\$1.64	\$1.64	83.65	Whistle to remind owners to change air filter	
4142	HVAC Equipment	Smart Vents/Sensors_ET	SF	N/A	NC	2,479.3	10%	247.9	0.306	15.0	\$800.00	\$400.00	1.21	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home	
4143	HVAC Equipment	Smart Thermostat - Gas / CAC	MF	NLI	Retrofit	2,163.0	10%	213.2	0.000	15.0	\$154.00	\$60.00	3.27	Smart thermostat	
4144	HVAC Equipment	WiFi Thermostat - Gas / CAC	MF	NLI	Retrofit	2,163.0	9%	202.7	0.000	15.0	\$103.20	\$50.00	2.53	Wifi (non-smart) thermostat	
4145	HVAC Equipment	Filter Whistle	MF	NLI	Retrofit	2,163.0	3%	73.4	0.058	15.0	\$1.64	\$1.64	61.32	Whistle to remind owners to change air filter	
4145	HVAC Equipment	Smart Thermostat - Gas / CAC	MF	LI	DI	2,163.0	10%	213.2	0.000	15.0	\$154.00	\$154.00	1.27	Smart thermostat	
4147	HVAC Equipment	WiFi Thermostat - Gas / CAC	MF	LI	DI	2,163.0	9%	202.7	0.000	15.0	\$103.20	\$103.20	1.22	Wifi (non-smart) thermostat	
4148	HVAC Equipment	Filter Whistle	MF	LI	DI	2,163.0	3%	73.4	0.058	15.0	\$1.64	\$1.64	61.32	Whistle to remind owners to change air filter	
4149	HVAC Equipment	Programmable Thermostat - Gas / CAC	MF	N/A	Retrofit	2,163.0	5%	117.0	0.000	15.0	\$35.00	\$10.00	7.56	Programmable thermostat	
4150	HVAC Equipment	Smart Vents/Sensors_ET	MF	N/A	Retrofit	2,163.0	10%	216.3	0.166	15.0	\$800.00	\$400.00	0.83	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home	
4151	HVAC Equipment	Programmable Thermostat - Gas / CAC	MF	N/A	NC	1,964.8	5%	106.0	0.000	15.0	\$35.00	\$10.00	7.20	Programmable thermostat	
4152	HVAC Equipment	Smart Thermostat - Gas / CAC	MF	N/A	NC	1,964.8	10%	193.8	0.000	15.0	\$154.00	\$60.00	3.25	Smart thermostat	
4153	HVAC Equipment	WiFi Thermostat - Gas / CAC	MF	N/A	NC	1,964.8	9%	183.6	0.000	15.0	\$103.20	\$50.00	2.40	Wifi (non-smart) thermostat	
4154	HVAC Equipment	Filter Whistle	MF	N/A	NC	1,964.8	3%	66.5	0.067	15.0	\$1.64	\$1.64	57.41	Whistle to remind owners to change air filter	
4155	HVAC Equipment	Smart Vents/Sensors_ET	MF	N/A	NC	1,964.8	10%	196.5	0.164	15.0	\$800.00	\$400.00	0.79	Smart vents relay temperature and occupancy information to a smart thermostat (or other control device) to reduce energy waste in unoccupied areas of the home	
5001	Lighting	LED 9W (Standard)	SF	NLI	MO	37.5	86%	32.2	0.040	15.0	\$1.01	\$0.76	25.14	Standard LED Replacing Standard Halogen/CFL Bulb	
5002	Lighting	LED 5W Globe (Specialty)	SF	NLI	MO	28.7	84%	24.1	0.023	15.0	\$4.00	\$3.00	4.36	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	

Vectren Electric Residential Measure Assumptions

Measure #	Category	Measure Name	Home Type	Measure Type	Replacement Type	Base Demand (kW)	% Reduction	Peak Demand (kW)	Base Demand (kWh)	Peak Demand (kWh)	Annual Savings (\$)	Net Present Value (\$)	Payback (Years)	Measure Description
5003	Lighting	LED R30 Dimmable (Reflector)	SF	NLI	MO	40.1	83%	33.1	0.041	15.0	\$5.34	\$4.01	4.98	Reflector LED Replacing Standard Halogen/Incandescent Bulb
5004	Lighting	LED Fixtures	SF	NLI	MO	82.0	74%	60.8	0.061	15.0	\$20.25	\$5.06	8.26	Residential Occupancy Sensors (DIRECT INSTALL)
5005	Lighting	Linear LED	SF	NLI	Retrofit	23.5	44%	10.3	0.014	9.0	\$7.00	\$5.25	0.73	T8 Linear Tube Fluorescent Replacing T12 LTF
5006	Lighting	Residential Occupancy Sensors	SF	NLI	Retrofit	108.9	35%	38.1	0.048	10.0	\$30.00	\$7.50	2.46	Residential Occupancy Sensors
5007	Lighting	Smart Lighting Switch_ET	SF	NLI	Retrofit	106.5	35%	37.3	0.047	10.0	\$25.00	\$6.25	2.88	Residential Occupancy Sensors
5008	Lighting	LED Nightlights	SF	NLI	Retrofit	14.6	93%	13.6	0.005	16.0	\$2.75	\$0.69	10.02	LED Nightlights Replacing Incandescent Nightlights
5009	Lighting	LED 13W (Exterior)	SF	NLI	MO	126.7	83%	105.2	0.048	15.0	\$4.76	\$4.00	12.59	Exterior LED Replacing Exterior Halogen/CFL Bulb
5010	Lighting	Exterior Lighting Controls	SF	NLI	Retrofit	178.1	35%	62.3	0.028	10.0	\$30.00	\$7.50	2.75	Residential Occupancy Sensors
5011	Lighting	DI LED 9W (Standard)	SF	NLI	DI	37.5	86%	32.2	0.040	15.0	\$3.00	\$3.00	6.35	Standard LED Replacing Standard Halogen/CFL Bulb
5012	Lighting	DI LED 5W Globe (Specialty)	SF	NLI	DI	28.7	84%	24.1	0.023	15.0	\$5.00	\$5.00	2.62	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)
5013	Lighting	DI LED R30 Dimmable (Reflector)	SF	NLI	DI	39.0	83%	32.3	0.040	15.0	\$8.63	\$8.63	2.25	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)
5014	Lighting	DI LED Nightlights	SF	NLI	DI	14.6	93%	13.6	0.005	16.0	\$2.75	\$2.75	2.50	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)
5015	Lighting	DI LED 9W (Standard)	SF	LI	DI	37.5	86%	32.2	0.040	15.0	\$3.00	\$3.00	6.35	Standard LED Replacing Standard Halogen/CFL Bulb
5016	Lighting	DI LED 5W Globe (Specialty)	SF	LI	DI	28.7	84%	24.1	0.023	15.0	\$5.00	\$5.00	2.62	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)
5017	Lighting	DI LED R30 Dimmable (Reflector)	SF	LI	DI	39.0	83%	32.3	0.040	15.0	\$8.63	\$8.63	2.25	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)
5018	Lighting	DI LED Nightlights	SF	LI	DI	14.6	93%	13.6	0.005	16.0	\$2.75	\$2.75	2.50	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)
5019	Lighting	DI LED 13W (Exterior)	SF	LI	DI	126.7	83%	105.2	0.048	15.0	\$6.76	\$6.76	7.45	Exterior LED Replacing Exterior Halogen/CFL Bulb
5020	Lighting	LED 9W (Standard)	SF	N/A	NC	37.5	86%	32.2	0.040	15.0	\$1.01	\$0.76	25.14	Standard LED Replacing Standard Halogen/CFL Bulb
5021	Lighting	LED 5W Globe (Specialty)	SF	N/A	NC	28.7	84%	24.1	0.023	15.0	\$4.00	\$3.00	4.36	Specialty LED Replacing Specialty Halogen/Incandescent Bulb
5022	Lighting	LED R30 Dimmable (Reflector)	SF	N/A	NC	40.1	83%	33.1	0.041	15.0	\$5.34	\$4.01	4.98	Reflector LED Replacing Standard Halogen/Incandescent Bulb
5023	Lighting	LED Fixtures	SF	N/A	NC	82.0	74%	60.8	0.061	15.0	\$20.25	\$5.06	8.26	Residential Occupancy Sensors (DIRECT INSTALL)
5024	Lighting	Linear LED	SF	N/A	NC	23.5	44%	10.3	0.014	9.0	\$2.50	\$1.88	2.06	T8 Linear Tube Fluorescent Replacing T12 LTF
5025	Lighting	Residential Occupancy Sensors	SF	N/A	NC	108.9	35%	38.1	0.048	10.0	\$30.00	\$7.50	2.46	Residential Occupancy Sensors
5026	Lighting	Smart Lighting Switch_ET	SF	N/A	NC	106.5	35%	37.3	0.047	10.0	\$25.00	\$6.25	2.88	Residential Occupancy Sensors
5027	Lighting	LED Nightlights	SF	N/A	NC	14.6	93%	13.6	0.005	16.0	\$2.75	\$0.69	10.02	LED Nightlights Replacing Incandescent Nightlights
5028	Lighting	LED 13W (Exterior)	SF	N/A	NC	126.7	83%	105.2	0.048	15.0	\$4.76	\$4.00	12.59	Exterior LED Replacing Exterior Halogen/CFL Bulb
5029	Lighting	Exterior Lighting Controls	SF	N/A	NC	178.1	35%	62.3	0.028	10.0	\$30.00	\$7.50	2.75	Residential Occupancy Sensors

Vectren Electric Residential Measure Assumptions

Measure #	End Use	Measure Name	From Type	To Type	Replacement Type	Base Annual Electric	% Save	Base Line Savings	Efficiency	Base Line Cost	Net Cost	Net Benefit	Net Payback	Notes
5030	Lighting	LED 9W (Standard)	MF	NLI	MO	37.5	86%	32.2	0.040	15.0	\$1.01	\$0.76	25.14	Standard LED Replacing Standard Halogen/CFL Bulb
5031	Lighting	LED 5W Globe (Specialty)	MF	NLI	MO	28.7	84%	24.1	0.023	15.0	\$4.00	\$3.00	4.36	Specialty LED Replacing Specialty Halogen/Incandescent Bulb
5032	Lighting	LED R30 Dimmable (Reflector)	MF	NLI	MO	40.1	83%	33.1	0.041	15.0	\$5.34	\$4.01	4.98	Reflector LED Replacing Standard Halogen/Incandescent Bulb
5033	Lighting	LED Fixtures	MF	NLI	MO	82.0	74%	60.8	0.061	15.0	\$20.25	\$5.06	8.26	Residential Occupancy Sensors (DIRECT INSTALL)
5034	Lighting	Linear LED	MF	NLI	Retrofit	23.5	44%	10.3	0.014	9.0	\$7.00	\$5.25	0.73	T8 Linear Tube Fluorescent Replacing T12 LTF
5035	Lighting	Residential Occupancy Sensors	MF	NLI	Retrofit	108.9	35%	38.1	0.048	10.0	\$30.00	\$7.50	2.46	Residential Occupancy Sensors
5036	Lighting	Smart Lighting Switch_ET	MF	NLI	Retrofit	106.5	35%	37.3	0.047	10.0	\$25.00	\$6.25	2.88	Residential Occupancy Sensors
5037	Lighting	LED Nightlights	MF	NLI	Retrofit	14.6	93%	13.6	0.005	16.0	\$2.75	\$0.69	10.02	LED Nightlights Replacing Incandescent Nightlights
5038	Lighting	LED 13W (Exterior)	MF	NLI	MO	126.7	83%	105.2	0.048	15.0	\$4.76	\$4.00	12.59	Exterior LED Replacing Exterior Halogen/CFL Bulb
5039	Lighting	Exterior Lighting Controls	MF	NLI	Retrofit	178.1	35%	62.3	0.028	10.0	\$30.00	\$7.50	2.75	Residential Occupancy Sensors
5040	Lighting	DI LED 9W (Standard)	MF	NLI	DI	37.5	86%	32.2	0.040	15.0	\$3.00	\$3.00	6.35	Standard LED Replacing Standard Halogen/CFL Bulb
5041	Lighting	DI LED 5W Globe (Specialty)	MF	NLI	DI	28.7	84%	24.1	0.023	15.0	\$5.00	\$5.00	2.62	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)
5042	Lighting	DI LED R30 Dimmable (Reflector)	MF	NLI	DI	39.0	83%	32.3	0.040	15.0	\$8.63	\$8.63	2.25	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)
5043	Lighting	DI LED Nightlights	MF	NLI	DI	14.6	93%	13.6	0.005	16.0	\$2.75	\$2.75	2.50	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)
5044	Lighting	DI LED 9W (Standard)	MF	LI	DI	37.5	86%	32.2	0.040	15.0	\$3.00	\$3.00	6.35	Standard LED Replacing Standard Halogen/CFL Bulb
5045	Lighting	DI LED 5W Globe (Specialty)	MF	LI	DI	28.7	84%	24.1	0.023	15.0	\$5.00	\$5.00	2.62	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)
5046	Lighting	DI LED R30 Dimmable (Reflector)	MF	LI	DI	39.0	83%	32.3	0.040	15.0	\$8.63	\$8.63	2.25	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)
5047	Lighting	DI LED Nightlights	MF	LI	DI	14.6	93%	13.6	0.005	16.0	\$2.75	\$2.75	2.50	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)
5048	Lighting	DI LED 13W (Exterior)	MF	LI	DI	126.7	83%	105.2	0.048	15.0	\$6.76	\$6.76	7.45	Exterior LED Replacing Exterior Halogen/CFL Bulb
5049	Lighting	LED 9W (Standard)	MF	N/A	NC	37.5	86%	32.2	0.040	15.0	\$1.01	\$0.76	25.14	Standard LED Replacing Standard Halogen/CFL Bulb
5050	Lighting	LED 5W Globe (Specialty)	MF	N/A	NC	28.7	84%	24.1	0.023	15.0	\$4.00	\$3.00	4.36	Specialty LED Replacing Specialty Halogen/Incandescent Bulb
5051	Lighting	LED R30 Dimmable (Reflector)	MF	N/A	NC	40.1	83%	33.1	0.041	15.0	\$5.34	\$4.01	4.98	Reflector LED Replacing Standard Halogen/Incandescent Bulb
5052	Lighting	LED Fixtures	MF	N/A	NC	82.0	74%	60.8	0.061	15.0	\$20.25	\$5.06	8.26	Residential Occupancy Sensors (DIRECT INSTALL)
5053	Lighting	Linear LED	MF	N/A	NC	23.5	44%	10.3	0.014	9.0	\$2.50	\$1.88	2.06	T8 Linear Tube Fluorescent Replacing T12 LTF
5054	Lighting	Residential Occupancy Sensors	MF	N/A	NC	108.9	35%	38.1	0.048	10.0	\$30.00	\$7.50	2.46	Residential Occupancy Sensors
5055	Lighting	Smart Lighting Switch_ET	MF	N/A	NC	106.5	35%	37.3	0.047	10.0	\$25.00	\$6.25	2.88	Residential Occupancy Sensors

Vectren Electric Residential Measure Assumptions

Measure #	End Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual kWh Use	% of Base Savings	Base kWh Savings	Customer kWh Savings	Dispatch Rate	Installed Measure Cost	Measure Lifetime	Net Present Value	Measure Description
5056	Lighting	LED Nightlights	MF	N/A	NC	14.6	93%	13.6	0.005	16.0	\$2.75	\$0.69	10.02	LED Nightlights Replacing Incandescent Nightlights
5057	Lighting	LED 13W (Exterior)	MF	N/A	NC	126.7	83%	105.2	0.048	15.0	\$4.76	\$4.00	12.59	Exterior LED Replacing Exterior Halogen/CFL Bulb
5058	Lighting	Exterior Lighting Controls	MF	N/A	NC	178.1	35%	62.3	0.028	10.0	\$30.00	\$7.50	2.75	Residential Occupancy Sensors
6001	Miscellaneous	Pool Heater	SF	N/A	MO	9,785.1	12%	1,173.5	0.000	10.0	\$3,333.33	\$1,000.00	0.39	Installation of high efficiency pool pump heater
6002	Miscellaneous	Pool Heater - Solar System	SF	N/A	MO	9,785.1	38%	3,735.8	0.000	10.0	\$3,500.00	\$1,000.00	1.24	This measure replaces a conventional pool heater with a solar system
6003	Miscellaneous	Hot Tub/Spa	SF	N/A	MO	0.0	0%	417.3	0.048	15.0	\$350.00	\$122.50	2.11	Installation of an efficient hot tub / spa
6004	Miscellaneous	Variable Speed Pool Pump	SF	N/A	MO	1,363.5	86%	1,172.6	2.068	10.0	\$750.00	\$300.00	7.62	Installation of variable speed pool pump
6005	Miscellaneous	Pool Timer	SF	N/A	Retrofit	0.0	0%	129.0	0.063	25.0	\$115.00	\$30.00	6.38	Installation of pool pump timer
6006	Miscellaneous	Well Pump	SF	N/A	MO	0.0	0%	187.0	0.022	20.0	\$110.00	\$30.00	4.80	Installation of high efficiency well pump in place of typical efficiency unit
6007	Miscellaneous	Pool Heater	SF	N/A	NC	9,785.1	12%	1,173.5	0.000	10.0	\$3,333.33	\$1,000.00	0.39	Installation of high efficiency pool pump heater
6008	Miscellaneous	Pool Heater - Solar System	SF	N/A	NC	9,785.1	35%	3,437.0	0.000	10.0	\$3,500.00	\$1,000.00	1.14	Installation of a solar pool heater instead of a conventional pool heater
6009	Miscellaneous	Hot Tub/Spa	SF	N/A	NC	0.0	0%	417.3	0.048	15.0	\$350.00	\$110.00	2.35	Installation of an efficient hot tub / spa
6010	Miscellaneous	Variable Speed Pool Pump	SF	N/A	NC	1,363.5	86%	1,172.6	2.068	10.0	\$750.00	\$300.00	7.62	Installation of variable speed pool pump
6011	Miscellaneous	Pool Timer	SF	N/A	NC	0.0	0%	108.3	0.063	25.0	\$50.00	\$20.00	8.85	Installation of pool pump timer
6012	Miscellaneous	Well Pump	SF	N/A	NC	0.0	0%	187.0	0.022	20.0	\$110.00	\$30.00	4.80	Installation of high efficiency well pump in place of typical efficiency unit
7001	New Construction	Gold Star: HERS Index Score ≤ 63 - Electric Heated	SF	N/A	NC	15,337.8	37%	5,675.0	0.824	25.0	\$2,504.19	\$700.00	6.78	Construction of home meeting Gold Star standard (HERS ≤63)
7002	New Construction	Platinum Star: HERS Index Score ≤ 60 - Electric Heated	SF	N/A	NC	15,337.8	40%	6,135.1	0.891	25.0	\$3,079.19	\$800.00	6.41	Construction of home meeting Platinum Star standard (HERS ≤60)
7003	New Construction	Gold Star: HERS Index Score ≤ 63 - Electric Heated	MF	N/A	NC	10,959.2	37%	4,054.9	0.491	25.0	\$2,504.19	\$1,000.00	3.32	Construction of home meeting Gold Star standard (HERS ≤63)
7004	New Construction	Platinum Star: HERS Index Score ≤ 60 - Electric Heated	MF	N/A	NC	10,959.2	40%	4,383.7	0.531	25.0	\$3,079.19	\$1,000.00	3.59	Construction of home meeting Platinum Star standard (HERS ≤60)
7005	New Construction	Gold Star: HERS Index Score ≤ 63 - Gas Heated	SF	N/A	NC	8,582.1	37%	3,175.4	0.904	25.0	\$1,573.27	\$175.00	23.67	Construction of home meeting Gold Star standard (HERS ≤63)
7006	New Construction	Platinum Star: HERS Index Score ≤ 60 - Gas Heated	SF	N/A	NC	8,582.1	40%	3,432.8	0.977	25.0	\$1,778.27	\$200.00	22.40	Construction of home meeting Platinum Star standard (HERS ≤60)
7007	New Construction	Gold Star: HERS Index Score ≤ 63 - Gas Heated	MF	N/A	NC	10,165.2	37%	3,761.1	0.605	25.0	\$1,573.27	\$775.00	4.72	Construction of home meeting Gold Star standard (HERS ≤63)
7008	New Construction	Platinum Star: HERS Index Score ≤ 60 - Gas Heated	MF	N/A	NC	10,165.2	40%	4,066.1	0.655	25.0	\$1,778.27	\$900.00	4.40	Construction of home meeting Platinum Star standard (HERS ≤60)
8001	Plug Loads	Smart Power Strips - Tier 1	SF	NLI	Retrofit	197.0	12%	23.0	0.003	4.0	\$35.00	\$35.00	0.10	Use of a smart strip instead of a standard power strip
8002	Plug Loads	Smart Power Strips - Tier 1	SF	LI	DI	197.0	12%	23.0	0.003	4.0	\$35.00	\$35.00	0.10	Use of a smart strip instead of a standard power strip
8003	Plug Loads	Efficient Laptop	SF	N/A	MO	50.3	72%	36.0	0.004	4.0	\$8.00	\$5.00	1.22	Installation of high-efficiency laptop computers in homes with laptop computers
8004	Plug Loads	Efficient Monitor	SF	N/A	MO	66.2	61%	40.2	0.020	5.0	\$10.00	\$5.00	3.83	Installation of high-efficiency displays (50% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with desktop computers
8005	Plug Loads	Efficient Personal Computer	SF	N/A	MO	238.5	32%	77.0	0.023	4.0	\$8.00	\$5.00	3.34	Installation of high-efficiency desktop computers in homes with desktop computers

Measure #		Measure Name	Home Type	Income Type	Step Measure	Base Demand (kWh)	% Base Demand	Efficient Demand (kWh)	Efficiency Measure	Base Cost (\$)	Efficient Cost (\$)	Net Cost (\$)	Payback (Years)	Measure Description
8006	Plug Loads	Efficient Multifunction	SF	N/A	MO	70.1	66%	46.4	0.011	6.0	\$1.00	\$5.00	2.71	Installation of high efficiency multifunction device instead of a standard efficiency unit
8007	Plug Loads	Efficient TV	SF	N/A	MO	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48	ENERGY STAR 7.0 television
8008	Plug Loads	Smart Television	SF	N/A	MO	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48	ENERGY STAR 7.0 television
8009	Plug Loads	Smart Power Strips - Tier 2	SF	N/A	Retrofit	678.0	36%	244.1	0.028	4.0	\$80.00	\$20.00	1.92	Use of a advanced power strip instead of a standard power strip
8010	Plug Loads	Smart Plug or Outlet_ET	SF	N/A	Retrofit	678.0	0%	0.0	0.000	4.0	\$20.00	\$10.00	0.00	Installation of smart plug to control plug loads
8011	Plug Loads	Efficient Laptop	SF	N/A	NC	50.3	72%	36.0	0.004	4.0	\$8.00	\$5.00	1.22	Installation of high-efficiency laptop computers in homes with laptop computers
8012	Plug Loads	Efficient Monitor	SF	N/A	NC	66.2	61%	40.2	0.020	5.0	\$10.00	\$5.00	3.83	Installation of high-efficiency displays (50% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with desktop computers
8013	Plug Loads	Efficient Personal Computer	SF	N/A	NC	238.5	32%	77.0	0.023	4.0	\$8.00	\$5.00	3.34	Installation of high-efficiency desktop computers in homes with desktop computers
8014	Plug Loads	Efficient Multifunction	SF	N/A	NC	70.1	66%	46.4	0.011	6.0	\$1.00	\$5.00	2.71	Installation of high efficiency multifunction device instead of a standard efficiency unit
8015	Plug Loads	Efficient TV	SF	N/A	NC	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48	ENERGY STAR 7.0 television
8016	Plug Loads	Smart Television	SF	N/A	NC	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48	ENERGY STAR 7.0 television
8017	Plug Loads	Smart Power Strips - Tier 1	SF	N/A	NC	197.0	12%	23.0	0.003	4.0	\$35.00	\$35.00	0.10	Use of a smart strip instead of a standard power strip
8018	Plug Loads	Smart Power Strips - Tier 2	SF	N/A	NC	678.0	36%	244.1	0.028	4.0	\$80.00	\$20.00	1.92	Use of a advanced power strip instead of a standard power strip
8019	Plug Loads	Smart Plug or Outlet_ET	SF	N/A	NC	678.0	0%	0.0	0.000	4.0	\$20.00	\$10.00	0.00	Installation of smart plug to control plug loads
8020	Plug Loads	Smart Power Strips - Tier 1	MF	NLI	Retrofit	197.0	12%	23.0	0.003	4.0	\$35.00	\$35.00	0.10	Use of a smart strip instead of a standard power strip
8021	Plug Loads	Smart Power Strips - Tier 1	MF	LI	DI	197.0	12%	23.0	0.003	4.0	\$35.00	\$35.00	0.10	Use of a smart strip instead of a standard power strip
8022	Plug Loads	Efficient Laptop	MF	N/A	MO	50.3	72%	36.0	0.004	4.0	\$8.00	\$5.00	1.22	Installation of high-efficiency laptop computers in homes with laptop computers
8023	Plug Loads	Efficient Monitor	MF	N/A	MO	66.2	61%	40.2	0.020	5.0	\$10.00	\$5.00	3.83	Installation of high-efficiency displays (50% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with desktop computers
8024	Plug Loads	Efficient Personal Computer	MF	N/A	MO	238.5	32%	77.0	0.023	4.0	\$8.00	\$5.00	3.34	Installation of high-efficiency desktop computers in homes with desktop computers
8025	Plug Loads	Efficient Multifunction	MF	N/A	MO	70.1	66%	46.4	0.011	6.0	\$1.00	\$5.00	2.71	Installation of high efficiency multifunction device instead of a standard efficiency unit
8026	Plug Loads	Efficient TV	MF	N/A	MO	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48	ENERGY STAR 7.0 television
8027	Plug Loads	Smart Television	MF	N/A	MO	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48	ENERGY STAR 7.0 television
8028	Plug Loads	Smart Power Strips - Tier 2	MF	N/A	Retrofit	678.0	36%	244.1	0.028	4.0	\$80.00	\$20.00	1.92	Use of a advanced power strip instead of a standard power strip
8029	Plug Loads	Smart Plug or Outlet_ET	MF	N/A	Retrofit	678.0	0%	0.0	0.000	4.0	\$20.00	\$10.00	0.00	Installation of smart plug to control plug loads

Vectren Electric		Residential Measure Assumptions													
Measure #	Category	Measure Name	Time Type	Measure Type	Replacement Type	Base Annual Energy	% After Savings	Base Energy Savings	Base Measure Cost	Net Cost	Net Savings	Net Payback	Net Present Value	Net Payback (Years)	Average Description
8030	Plug Loads	Efficient Laptop	MF	N/A	NC	50.3	72%	36.0	0.004	4.0	\$8.00	\$5.00	1.22		Installation of high-efficiency laptop computers in homes with laptop computers
8031	Plug Loads	Efficient Monitor	MF	N/A	NC	66.2	61%	40.2	0.020	5.0	\$10.00	\$5.00	3.83		Installation of high-efficiency displays (50% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with desktop computers
8032	Plug Loads	Efficient Personal Computer	MF	N/A	NC	238.5	32%	77.0	0.023	4.0	\$8.00	\$5.00	3.34		Installation of high-efficiency desktop computers in homes with desktop computers
8033	Plug Loads	Efficient Multifunction	MF	N/A	NC	70.1	66%	46.4	0.011	6.0	\$1.00	\$5.00	2.71		Installation of high efficiency multifunction device instead of a standard efficiency unit
8034	Plug Loads	Efficient TV	MF	N/A	NC	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48		ENERGY STAR 7.0 television
8035	Plug Loads	Smart Television	MF	N/A	NC	664.4	27%	179.4	0.098	6.0	\$10.00	\$5.00	10.48		ENERGY STAR 7.0 television
8036	Plug Loads	Smart Power Strips - Tier 1	MF	N/A	NC	197.0	12%	23.0	0.003	4.0	\$35.00	\$35.00	0.10		Use of a smart strip instead of a standard power strip
8037	Plug Loads	Smart Power Strips - Tier 2	MF	N/A	NC	678.0	36%	244.1	0.028	4.0	\$80.00	\$20.00	1.92		Use of a advanced power strip instead of a standard power strip
8038	Plug Loads	Smart Plug or Outlet_ET	MF	N/A	NC	678.0	0%	0.0	0.000	4.0	\$20.00	\$10.00	0.00		Installation of smart plug to control plug loads
9001	HVAC Shell	Duct Sealing - Average Sealing - Heat pump	SF	NLI	Retrofit	7,269.4	3%	242.8	0.064	20.0	\$200.00	\$175.00	1.14		15% to 10% leakage
9002	HVAC Shell	Duct Sealing - Inadequate Sealing - Heat pump	SF	NLI	Retrofit	7,376.9	5%	397.5	0.158	20.0	\$350.00	\$300.00	1.21		20% to 15% leakage
9003	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Heat pump	SF	NLI	Retrofit	7,502.4	14%	1,013.0	0.414	20.0	\$1,442.50	\$1,000.00	0.94		25% to 15% leakage
9004	HVAC Shell	Wall Insulation - Heat pump	SF	NLI	Retrofit	8,887.1	29%	2,565.9	0.867	25.0	\$2,746.80	\$450.00	5.67		R0 to R11 wall insulation
9005	HVAC Shell	Air Sealing Average Sealing - Heat pump	SF	NLI	Retrofit	6,321.2	11%	709.6	0.179	15.0	\$624.65	\$200.00	2.32		10 ACH 50 to 7 ACH 50
9006	HVAC Shell	Air Sealing Inadequate Sealing - Heat pump	SF	NLI	Retrofit	7,284.2	13%	963.0	0.251	15.0	\$967.20	\$200.00	3.15		14 ACH 50 to 10 ACH 50
9007	HVAC Shell	Air Sealing Poor Sealing - Heat pump	SF	NLI	Retrofit	8,949.1	19%	1,664.9	0.389	15.0	\$967.20	\$200.00	5.46		20 ACH 50 to 14 ACH 50
9008	HVAC Shell	Attic Insulation - Average Insulation - Heat pump	SF	NLI	Retrofit	6,321.2	3%	190.5	0.067	25.0	\$1,259.70	\$450.00	0.43		R30 to R60
9009	HVAC Shell	Attic Insulation - Inadequate Insulation - Heat pump	SF	NLI	Retrofit	6,568.9	7%	438.2	0.172	25.0	\$1,744.20	\$450.00	1.04		R19 to R60
9010	HVAC Shell	Attic Insulation - Poor Insulation - Heat pump	SF	NLI	Retrofit	6,932.3	11%	761.0	0.321	25.0	\$1,550.40	\$450.00	1.84		R11 to R49
9011	HVAC Shell	Duct Sealing - Average Sealing - Electric furnace	SF	NLI	Retrofit	13,437.5	3%	411.6	0.036	20.0	\$200.00	\$175.00	1.59		15% to 10% leakage
9012	HVAC Shell	Duct Sealing - Inadequate Sealing - Electric furnace	SF	NLI	Retrofit	13,620.9	5%	677.9	0.109	20.0	\$350.00	\$300.00	1.65		20% to 15% leakage
9013	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Electric furnace	SF	NLI	Retrofit	13,842.1	13%	1,759.1	0.282	20.0	\$1,442.50	\$1,000.00	1.29		25% to 15% leakage
9014	HVAC Shell	Wall Insulation - Electric furnace	SF	NLI	Retrofit	17,267.5	32%	5,582.7	0.887	25.0	\$2,746.80	\$450.00	10.41		R0 to R11 wall insulation
9015	HVAC Shell	Air Sealing Average Sealing - Electric furnace	SF	NLI	Retrofit	11,684.8	14%	1,598.5	0.215	15.0	\$624.65	\$200.00	4.58		10 ACH 50 to 7 ACH 50
9016	HVAC Shell	Air Sealing Inadequate Sealing - Electric furnace	SF	NLI	Retrofit	13,876.8	16%	2,192.0	0.294	15.0	\$967.20	\$200.00	6.27		14 ACH 50 to 10 ACH 50
9017	HVAC Shell	Air Sealing Poor Sealing - Electric furnace	SF	NLI	Retrofit	17,296.5	20%	3,419.8	0.378	15.0	\$967.20	\$200.00	9.63		20 ACH 50 to 14 ACH 50

Vectren Electric Residential Measure Assumptions

Measure #	Measure	Measure Name	Home Type	Measure Type	Replacement Type	Base Measure	% Effect	Base Cost	Measure Cost	Energy Use	Annual Savings	Net Present Value	Payback Period	Measure Description
9018	HVAC Shell	Attic Insulation - Average Insulation - Electric furnace	SF	NLI	Retrofit	11,684.8	3%	349.3	0.052	25.0	\$1,259.70	\$450.00	0.65	R30 to R60
9019	HVAC Shell	Attic Insulation - Inadequate Insulation - Electric furnace	SF	NLI	Retrofit	12,144.6	7%	809.2	0.133	25.0	\$1,744.20	\$450.00	1.53	R19 to R60
9020	HVAC Shell	Attic Insulation - Poor Insulation - Electric furnace	SF	NLI	Retrofit	12,884.7	11%	1,476.9	0.278	25.0	\$1,550.40	\$450.00	2.87	R11 to R49
9021	HVAC Shell	Duct Sealing - Average Sealing - Heat pump	SF	LI	DI	7,269.4	3%	242.8	0.064	20.0	\$200.00	\$200.00	1.00	15% to 10% leakage
9022	HVAC Shell	Duct Sealing - Inadequate Sealing - Heat pump	SF	LI	DI	7,376.9	5%	397.5	0.158	20.0	\$350.00	\$350.00	1.04	20% to 15% leakage
9023	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Heat pump	SF	LI	DI	7,502.4	14%	1,013.0	0.414	20.0	\$1,442.50	\$1,442.50	0.65	25% to 15% leakage
9024	HVAC Shell	Wall Insulation - Heat pump	SF	LI	DI	8,887.1	29%	2,565.9	0.867	25.0	\$2,746.80	\$2,746.80	0.93	R0 to R11 wall insulation
9025	HVAC Shell	Air Sealing Average Sealing - Heat pump	SF	LI	DI	6,321.2	11%	709.6	0.179	15.0	\$624.65	\$624.65	0.74	10 ACH 50 to 7 ACH 50
9026	HVAC Shell	Air Sealing Inadequate Sealing - Heat pump	SF	LI	DI	7,284.2	13%	963.0	0.251	15.0	\$967.20	\$967.20	0.65	14 ACH 50 to 10 ACH 50
9027	HVAC Shell	Air Sealing Poor Sealing - Heat pump	SF	LI	DI	8,949.1	19%	1,664.9	0.389	15.0	\$967.20	\$967.20	1.13	20 ACH 50 to 14 ACH 50
9028	HVAC Shell	Attic Insulation - Average Insulation - Heat pump	SF	LI	DI	6,321.2	3%	190.5	0.067	25.0	\$1,259.70	\$1,259.70	0.16	R30 to R60
9029	HVAC Shell	Attic Insulation - Inadequate Insulation - Heat pump	SF	LI	DI	6,568.9	7%	438.2	0.172	25.0	\$1,744.20	\$1,744.20	0.27	R19 to R60
9030	HVAC Shell	Attic Insulation - Poor Insulation - Heat pump	SF	LI	DI	6,932.3	11%	761.0	0.3	25.0	\$1,550.40	\$1,550.40	0.53	R11 to R49
9031	HVAC Shell	Duct Sealing - Average Sealing - Electric furnace	SF	LI	DI	13,437.5	3%	411.6	0.036	20.0	\$200.00	\$200.00	1.39	15% to 10% leakage
9032	HVAC Shell	Duct Sealing - Inadequate Sealing - Electric furnace	SF	LI	DI	13,620.9	5%	677.9	0.109	20.0	\$350.00	\$350.00	1.42	20% to 15% leakage
9033	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Electric furnace	SF	LI	DI	13,842.1	13%	1,759.1	0.282	20.0	\$1,442.50	\$1,442.50	0.89	25% to 15% leakage
9034	HVAC Shell	Wall Insulation - Electric furnace	SF	LI	DI	17,267.5	32%	5,582.7	0.887	25.0	\$2,746.80	\$2,746.80	1.71	R0 to R11 wall insulation
9035	HVAC Shell	Air Sealing Average Sealing - Electric furnace	SF	LI	DI	11,684.8	14%	1,598.5	0.215	15.0	\$624.65	\$624.65	1.47	10 ACH 50 to 7 ACH 50
9036	HVAC Shell	Air Sealing Inadequate Sealing - Electric furnace	SF	LI	DI	13,876.8	16%	2,192.0	0.294	15.0	\$967.20	\$967.20	1.30	14 ACH 50 to 10 ACH 50
9037	HVAC Shell	Air Sealing Poor Sealing - Electric furnace	SF	LI	DI	17,296.5	20%	3,419.8	0.378	15.0	\$967.20	\$967.20	1.99	20 ACH 50 to 14 ACH 50
9038	HVAC Shell	Attic Insulation - Average Insulation - Electric furnace	SF	LI	DI	11,684.8	3%	349.3	0.052	25.0	\$1,259.70	\$1,259.70	0.23	R30 to R60
9039	HVAC Shell	Attic Insulation - Inadequate Insulation - Electric furnace	SF	LI	DI	12,144.6	7%	809.2	0.133	25.0	\$1,744.20	\$1,744.20	0.40	R19 to R60
9040	HVAC Shell	Attic Insulation - Poor Insulation - Electric furnace	SF	LI	DI	12,884.7	11%	1,476.9	0.278	25.0	\$1,550.40	\$1,550.40	0.83	R11 to R49
9041	HVAC Shell	Radiant Barrier - Heat pump	SF	N/A	Retrofit	6,321.2	1%	82.5	0.1	20.0	\$416.67	\$130.00	0.90	Installation of radiant barrier
9042	HVAC Shell	Cool Roof - Heat pump	SF	N/A	Retrofit	6,321.2	2%	111.1	0.1	20.0	\$3,876.00	\$1,000.00	0.18	Installation of cool roof
9043	HVAC Shell	Wall Sheathing - Heat pump	SF	N/A	Retrofit	6,321.2	14%	879.9	0.269	20.0	\$2,943.00	\$1,000.00	0.77	R12 polyiso
9044	HVAC Shell	ENERGY STAR Windows - Heat pump	SF	N/A	Retrofit	6,321.2	9%	548.8	0.372	25.0	\$13,601.25	\$1,000.00	0.74	U=0.30; SHGC=0.40
9045	HVAC Shell	Basement Sidewall Insulation - Heat pump	SF	N/A	Retrofit	6,678.1	5%	356.9	0.033	25.0	\$2,720.00	\$1,000.00	0.28	R0 to R13 sidewall insulation

Vectren Electric Residential Measure Assumptions

Measure #	End Use	Measure Name	Home Type	Income Type	Requirements Type	Base Cost	% Base Savings	Estimated Base Cost Savings	Net Cost	Base Cost	Estimated Base Cost Savings	Net Cost	Measure Description	
9046	HVAC Shell	Floor Insulation Above Crawlspace - Heat pump	SF	N/A	Retrofit	6,359.1	1%	37.9	-0.044	25.0	\$316.20	\$90.00	0.00	R13 floor insulation
9047	HVAC Shell	ENERGY STAR Door - Heat pump	SF	N/A	Retrofit	6,321.2	2%	129.9	0.046	25.0	\$388.00	\$120.00	1.10	Fiberglass
9048	HVAC Shell	Smart Window Coverings - Shade/Blind/Controller/Sensor - Heat pump_ET	SF	N/A	Retrofit	6,321.2	16%	979.8	0.471	7.0	\$14,875.00	\$1,000.00	0.41	Smart shades
9049	HVAC Shell	Smart Window Coverings - Film/Transformer - Heat pump_ET	SF	N/A	Retrofit	6,321.2	16%	979.8	0.471	7.0	\$8,160.75	\$1,000.00	0.41	Smart films
9050	HVAC Shell	Radiant Barrier - Electric furnace	SF	N/A	Retrofit	11,684.8	1%	102.2	0.065	20.0	\$416.67	\$130.00	0.91	Installation of radiant barrier
9051	HVAC Shell	Cool Roof - Electric furnace	SF	N/A	Retrofit	11,684.8	0%	-21.1	0.079	20.0	\$3,876.00	\$1,000.00	0.06	Installation of cool roof
9052	HVAC Shell	Wall Sheathing - Electric furnace	SF	N/A	Retrofit	11,684.8	16%	1,837.2	0.2	20.0	\$2,943.00	\$1,000.00	1.31	R12 polyiso
9053	HVAC Shell	ENERGY STAR Windows - Electric furnace	SF	N/A	Retrofit	11,684.8	7%	798.3	0.3	25.0	\$13,601.25	\$1,000.00	0.89	U=0.30; SHGC=0.40
9054	HVAC Shell	Basement Sidewall Insulation - Electric furnace	SF	N/A	Retrofit	12,616.3	7%	931.6	0.031	25.0	\$2,720.00	\$1,000.00	0.67	R0 to R13 sidewall insulation
9055	HVAC Shell	Floor Insulation Above Crawlspace - Electric furnace	SF	N/A	Retrofit	11,922.5	2%	237.7	-0.028	25.0	\$316.20	\$90.00	1.54	R13 floor insulation
9056	HVAC Shell	ENERGY STAR Door - Electric furnace	SF	N/A	Retrofit	11,684.8	2%	227.3	0.035	25.0	\$388.00	\$120.00	1.58	Fiberglass
9057	HVAC Shell	Smart Window Coverings - Shade/Blind/Controller/Sensor - Electric furnace_ET	SF	N/A	Retrofit	11,684.8	16%	1,811.1	0.498	7.0	\$14,875.00	\$1,000.00	0.62	Smart shades
9058	HVAC Shell	Smart Window Coverings - Film/Transformer - Electric furnace_ET	SF	N/A	Retrofit	11,684.8	16%	1,811.1	0.498	7.0	\$8,160.75	\$1,000.00	0.62	Smart films
9059	HVAC Shell	Duct Sealing - Average Sealing - Heat pump	MF	NLI	Retrofit	3,646.6	8%	300.6	0.140	20.0	\$200.00	\$175.00	1.81	15% to 10% leakage
9060	HVAC Shell	Duct Sealing - Inadequate Sealing - Heat pump	MF	NLI	Retrofit	3,815.6	16%	624.5	0.281	20.0	\$350.00	\$300.00	2.20	20% to 15% leakage
9061	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Heat pump	MF	NLI	Retrofit	4,021.6	41%	1,630.6	0.741	20.0	\$981.00	\$500.00	3.46	25% to 15% leakage
9062	HVAC Shell	Wall Insulation - Heat pump	MF	NLI	Retrofit	4,066.7	22%	895.7	0.261	25.0	\$1,189.20	\$450.00	2.04	R0 to R11 wall insulation
9063	HVAC Shell	Air Sealing Average Sealing - Heat pump	MF	NLI	Retrofit	3,171.0	7%	207.6	0.0	15.0	\$309.69	\$200.00	0.57	10 ACH 50 to 7 ACH 50
9064	HVAC Shell	Air Sealing Inadequate Sealing - Heat pump	MF	NLI	Retrofit	3,580.6	11%	409.6	0.1	15.0	\$479.52	\$200.00	1.35	14 ACH 50 to 10 ACH 50
9065	HVAC Shell	Air Sealing Poor Sealing - Heat pump	MF	NLI	Retrofit	4,306.5	17%	725.9	0.152	15.0	\$479.52	\$200.00	2.42	20 ACH 50 to 14 ACH 50
9066	HVAC Shell	Attic Insulation - Average Insulation - Heat pump	MF	NLI	Retrofit	3,171.0	3%	102.4	0.045	25.0	\$1,298.70	\$450.00	0.27	R30 to R60
9067	HVAC Shell	Attic Insulation - Inadequate Insulation - Heat pump	MF	NLI	Retrofit	3,295.1	7%	226.5	0.101	25.0	\$1,798.20	\$450.00	0.60	R19 to R60
9068	HVAC Shell	Attic Insulation - Poor Insulation - Heat pump	MF	NLI	Retrofit	3,479.2	11%	393.2	0.178	25.0	\$1,598.40	\$450.00	1.04	R11 to R49
9069	HVAC Shell	Duct Sealing - Average Sealing - Electric furnace	MF	NLI	Retrofit	5,719.1	8%	457.5	0.203	20.0	\$200.00	\$175.00	2.71	15% to 10% leakage
9070	HVAC Shell	Duct Sealing - Inadequate Sealing - Electric furnace	MF	NLI	Retrofit	5,935.5	13%	799.9	0.319	20.0	\$350.00	\$300.00	2.68	20% to 15% leakage
9071	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Electric furnace	MF	NLI	Retrofit	6,195.8	33%	2,072.8	0.861	20.0	\$981.00	\$500.00	4.24	25% to 15% leakage

Vectren Electric Residential Measure Assumptions

Measure #	Measure	Measure Name	Home Type	Measure Type	Replacement Type	Base Measure Energy Use (kWh)	% Reduction	Base Measure Cost (\$)	Measure Energy Use (kWh)	Measure Cost (\$)	Net Cost (\$)	Payback (Years)	Measure Description	
9072	HVAC Shell	Wall Insulation - Electric furnace	MF	NLI	Retrofit	6,808.6	27%	1,835.5	0.274	25.0	\$1,159.20	\$450.00	3.52	R0 to R11 wall insulation
9073	HVAC Shell	Air Sealing Average Sealing - Electric furnace	MF	NLI	Retrofit	4,973.1	11%	531.4	0.025	15.0	\$309.69	\$200.00	1.38	10 ACH 50 to 7 ACH 50
9074	HVAC Shell	Air Sealing Inadequate Sealing - Electric furnace	MF	NLI	Retrofit	5,850.0	15%	876.9	0.094	15.0	\$479.52	\$200.00	2.50	14 ACH 50 to 10 ACH 50
9075	HVAC Shell	Air Sealing Poor Sealing - Electric furnace	MF	NLI	Retrofit	7,325.7	20%	1,475.7	0.162	15.0	\$479.52	\$200.00	4.26	20 ACH 50 to 14 ACH 50
9076	HVAC Shell	Attic Insulation - Average Insulation - Electric furnace	MF	NLI	Retrofit	4,973.1	4%	200.1	0.063	25.0	\$1,298.70	\$450.00	0.46	R30 to R60
9077	HVAC Shell	Attic Insulation - Inadequate Insulation - Electric furnace	MF	NLI	Retrofit	5,177.1	8%	404.1	0.123	25.0	\$1,798.20	\$450.00	0.92	R19 to R60
9078	HVAC Shell	Attic Insulation - Poor Insulation - Electric furnace	MF	NLI	Retrofit	5,506.9	13%	695.7	0.205	25.0	\$1,598.40	\$450.00	1.58	R11 to R49
9079	HVAC Shell	Duct Sealing - Average Sealing - Heat pump	MF	LI	DI	3,646.6	8%	300.6	0.140	20.0	\$200.00	\$200.00	1.58	15% to 10% leakage
9080	HVAC Shell	Duct Sealing - Inadequate Sealing - Heat pump	MF	LI	DI	3,815.6	16%	624.5	0.281	20.0	\$350.00	\$350.00	1.89	20% to 15% leakage
9081	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Heat pump	MF	LI	DI	4,021.6	41%	1,630.6	0.741	20.0	\$981.00	\$981.00	1.76	25% to 15% leakage
9082	HVAC Shell	Wall Insulation - Heat pump	MF	LI	DI	4,066.7	22%	895.7	0.261	25.0	\$1,159.20	\$1,159.20	0.79	R0 to R11 wall insulation
9083	HVAC Shell	Air Sealing Average Sealing - Heat pump	MF	LI	DI	3,171.0	7%	207.6	0.017	15.0	\$309.69	\$309.69	0.37	10 ACH 50 to 7 ACH 50
9084	HVAC Shell	Air Sealing Inadequate Sealing - Heat pump	MF	LI	DI	3,580.6	11%	409.6	0.087	15.0	\$479.52	\$479.52	0.56	14 ACH 50 to 10 ACH 50
9085	HVAC Shell	Air Sealing Poor Sealing - Heat pump	MF	LI	DI	4,306.5	17%	725.9	0.152	15.0	\$479.52	\$479.52	1.01	20 ACH 50 to 14 ACH 50
9086	HVAC Shell	Attic Insulation - Average Insulation - Heat pump	MF	LI	DI	3,171.0	3%	102.4	0.045	25.0	\$1,298.70	\$1,298.70	0.09	R30 to R60
9087	HVAC Shell	Attic Insulation - Inadequate Insulation - Heat pump	MF	LI	DI	3,295.1	7%	226.5	0.101	25.0	\$1,798.20	\$1,798.20	0.15	R19 to R60
9088	HVAC Shell	Attic Insulation - Poor Insulation - Heat pump	MF	LI	DI	3,479.2	11%	393.2	0.178	25.0	\$1,598.40	\$1,598.40	0.29	R11 to R49
9089	HVAC Shell	Duct Sealing - Average Sealing - Electric furnace	MF	LI	DI	5,719.1	8%	457.5	0.203	20.0	\$200.00	\$200.00	2.37	15% to 10% leakage
9090	HVAC Shell	Duct Sealing - Inadequate Sealing - Electric furnace	MF	LI	DI	5,935.5	13%	789.9	0.319	20.0	\$350.00	\$350.00	2.30	20% to 15% leakage
9091	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Electric furnace	MF	LI	DI	6,195.8	33%	2,072.8	0.861	20.0	\$981.00	\$981.00	2.16	25% to 15% leakage
9092	HVAC Shell	Wall Insulation - Electric furnace	MF	LI	DI	6,808.6	27%	1,835.5	0.274	25.0	\$1,159.20	\$1,159.20	1.36	R0 to R11 wall insulation
9093	HVAC Shell	Air Sealing Average Sealing - Electric furnace	MF	LI	DI	4,973.1	11%	531.4	0.025	15.0	\$309.69	\$309.69	0.89	10 ACH 50 to 7 ACH 50
9094	HVAC Shell	Air Sealing Inadequate Sealing - Electric furnace	MF	LI	DI	5,850.0	15%	876.9	0.094	15.0	\$479.52	\$479.52	1.04	14 ACH 50 to 10 ACH 50
9095	HVAC Shell	Air Sealing Poor Sealing - Electric furnace	MF	LI	DI	7,325.7	20%	1,475.7	0.162	15.0	\$479.52	\$479.52	1.78	20 ACH 50 to 14 ACH 50
9096	HVAC Shell	Attic Insulation - Average Insulation - Electric furnace	MF	LI	DI	4,973.1	4%	200.1	0.063	25.0	\$1,298.70	\$1,298.70	0.16	R30 to R60
9097	HVAC Shell	Attic Insulation - Inadequate Insulation - Electric furnace	MF	LI	DI	5,177.1	8%	404.1	0.123	25.0	\$1,798.20	\$1,798.20	0.23	R19 to R60
9098	HVAC Shell	Attic Insulation - Poor Insulation - Electric furnace	MF	LI	DI	5,506.9	13%	695.7	0.205	25.0	\$1,598.40	\$1,598.40	0.44	R11 to R49
9099	HVAC Shell	Radiant Barrier - Heat pump	MF	N/A	Retrofit	3,171.0	-6%	-202.0	-0.062	20.0	\$429.57	\$130.00	0.00	Installation of radiant barrier

Vectren Electric Residential Measure Assumptions

Measure #	Measure Type	Measure Name	Home Type	Measure Type	Replacement Type	Base Annual Energy Use (kWh)	% Savings	Base Annual Savings (\$)	Net Annual Savings (\$)	Annual Rate	Initial Measure Cost (\$)	Annual Net Savings (\$)	Payback Ratio	Measure Description
9100	HVAC Shell	Cool Roof - Heat pump	MF	N/A	Retrofit	3,171.0	-22%	-688.2	-0.120	20.0	\$3,996.00	\$1,000.00	0.00	Installation of cool roof
9101	HVAC Shell	Wall Sheathing - Heat pump	MF	N/A	Retrofit	3,171.0	10%	311.5	0.091	25.0	\$1,242.00	\$625.00	0.50	R12 polyiso
9102	HVAC Shell	ENERGY STAR Windows - Heat pump	MF	N/A	Retrofit	3,171.0	8%	266.8	0.162	25.0	\$6,743.25	\$1,000.00	0.35	U=0.30; SHGC=0.40
9103	HVAC Shell	Basement Sidewall Insulation - Heat pump	MF	N/A	Retrofit	3,477.9	9%	306.9	0.064	25.0	\$2,815.20	\$1,000.00	0.28	R0 to R13 sidewall insulation
9104	HVAC Shell	Floor Insulation Above Crawlspace - Heat pump	MF	N/A	Retrofit	3,277.2	3%	106.2	0.201	25.0	\$849.15	\$425.00	0.23	R13 floor insulation
9105	HVAC Shell	Smart Window Coverings - Shade/Blind/Controller/Sensor - Heat pump_ET	MF	N/A	Retrofit	3,171.0	16%	491.5	0.211	7.0	\$8,500.00	\$1,000.00	0.22	Smart shades
9106	HVAC Shell	Smart Window Coverings - Film/Transformer - Heat pump_ET	MF	N/A	Retrofit	3,171.0	16%	491.5	0.211	7.0	\$4,045.95	\$1,000.00	0.22	Smart films
9107	HVAC Shell	Radiant Barrier - Electric furnace	MF	N/A	Retrofit	4,973.1	-6%	-281.8	-0.073	20.0	\$429.57	\$130.00	0.00	Installation of radiant barrier
9108	HVAC Shell	Cool Roof - Electric furnace	MF	N/A	Retrofit	4,973.1	-33%	-1,661.4	-0.092	20.0	\$3,996.00	\$1,000.00	0.00	Installation of cool roof
9109	HVAC Shell	Wall Sheathing - Electric furnace	MF	N/A	Retrofit	4,973.1	13%	662.3	0.414	25.0	\$1,242.00	\$625.00	1.44	R12 polyiso
9110	HVAC Shell	ENERGY STAR Windows - Electric furnace	MF	N/A	Retrofit	4,973.1	8%	415.9	0.184	25.0	\$6,743.25	\$1,000.00	0.48	U=0.30; SHGC=0.40
9111	HVAC Shell	Basement Sidewall Insulation - Electric furnace	MF	N/A	Retrofit	5,634.1	12%	661.0	0.069	25.0	\$2,815.20	\$1,000.00	0.54	R0 to R13 sidewall insulation
9112	HVAC Shell	Floor Insulation Above Crawlspace - Electric furnace	MF	N/A	Retrofit	7,848.5	37%	2,875.4	-0.304	25.0	\$849.15	\$425.00	3.86	R13 floor insulation
9113	HVAC Shell	Smart Window Coverings - Shade/Blind/Controller/Sensor - Electric furnace_ET	MF	N/A	Retrofit	4,973.1	16%	770.8	0.238	7.0	\$8,500.00	\$1,000.00	0.30	Smart shades
9114	HVAC Shell	Smart Window Coverings - Film/Transformer - Electric furnace_ET	MF	N/A	Retrofit	4,973.1	16%	770.8	0.238	7.0	\$4,045.95	\$1,000.00	0.30	Smart films
9115	HVAC Shell	Duct Sealing - Average Sealing - Gas Heating	SF	NLI	Retrofit	3,380.5	5%	161.5	0.131	20.0	\$200.00	\$175.00	1.61	15% to 10% leakage
9116	HVAC Shell	Duct Sealing - Inadequate Sealing - Gas Heating	SF	NLI	Retrofit	3,442.6	7%	229.5	0.115	20.0	\$350.00	\$300.00	1.25	20% to 15% leakage
9117	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Gas Heating	SF	NLI	Retrofit	3,501.7	15%	526.8	0.297	20.0	\$1,442.50	\$1,000.00	0.91	25% to 15% leakage
9118	HVAC Shell	Wall Insulation - Gas Heating	SF	NLI	Retrofit	3,509.2	16%	569.6	0.541	25.0	\$2,746.80	\$450.00	6.29	R0 to R11 wall insulation
9119	HVAC Shell	Air Sealing - Average Sealing - Gas Heating	SF	NLI	Retrofit	2,939.6	7%	206.9	0.353	15.0	\$624.65	\$100.00	7.18	10 ACH 50 to 7 ACH 50
9120	HVAC Shell	Air Sealing - Inadequate Sealing - Gas Heating	SF	NLI	Retrofit	3,363.5	13%	423.9	0.392	15.0	\$967.20	\$100.00	10.02	14 ACH 50 to 10 ACH 50
9121	HVAC Shell	Air Sealing - Poor Sealing - Gas Heating	SF	NLI	Retrofit	4,030.0	17%	666.6	0.558	15.0	\$967.20	\$100.00	15.38	20 ACH 50 to 14 ACH 50
9122	HVAC Shell	Attic Insulation - Average Insulation - Gas Heating	SF	NLI	Retrofit	2,939.6	2%	62.9	0.076	25.0	\$1,259.70	\$450.00	0.48	R30 to R60
9123	HVAC Shell	Attic Insulation - Inadequate Insulation - Gas Heating	SF	NLI	Retrofit	2,997.7	4%	120.9	0.143	25.0	\$1,744.20	\$450.00	1.00	R19 to R60
9124	HVAC Shell	Attic Insulation - Poor Insulation - Gas Heating	SF	NLI	Retrofit	3,135.8	8%	241.1	0.225	25.0	\$1,550.40	\$450.00	1.81	R11 to R49
9125	HVAC Shell	Duct Sealing - Average Sealing - Gas Heating	SF	LI	DI	3,380.5	5%	161.5	0.131	20.0	\$200.00	\$200.00	1.41	15% to 10% leakage
9126	HVAC Shell	Duct Sealing - Inadequate Sealing - Gas Heating	SF	LI	DI	3,442.6	7%	229.5	0.115	20.0	\$350.00	\$350.00	1.08	20% to 15% leakage

Vectren Electric Residential Measure Assumptions

Measure #	Category	Measure Name	Home Type	Home Envelope	Replacement Type	Base Annual Demand	% Reduction	Energy Savings	CO ₂ Savings	Peak Demand	Annual Energy Cost	Annual Energy Savings	Net Present Value	Payback	Measure Description
9127	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Gas Heating	SF	LI	DI	3,501.7	15%	526.8	0.297	20.0	\$1,442.50	\$1,442.50	0.63	25% to 15% leakage	
9128	HVAC Shell	Wall Insulation - Gas Heating	SF	LI	DI	3,509.2	16%	569.6	0.541	25.0	\$2,746.80	\$2,746.80	1.03	R0 to R11 wall insulation	
9129	HVAC Shell	Air Sealing - Average Sealing - Gas Heating	SF	LI	DI	2,939.6	7%	206.9	0.353	15.0	\$624.65	\$624.65	1.15	10 ACH 50 to 7 ACH 50	
9130	HVAC Shell	Air Sealing - Inadequate Sealing - Gas Heating	SF	LI	DI	3,363.5	13%	423.9	0.392	15.0	\$967.20	\$967.20	1.04	14 ACH 50 to 10 ACH 50	
9131	HVAC Shell	Air Sealing - Poor Sealing - Gas Heating	SF	LI	DI	4,030.0	17%	666.6	0.558	15.0	\$967.20	\$967.20	1.59	20 ACH 50 to 14 ACH 50	
9132	HVAC Shell	Attic Insulation - Average Insulation - Gas Heating	SF	LI	DI	2,939.6	2%	62.9	0.076	25.0	\$1,259.70	\$1,259.70	0.17	R30 to R60	
9133	HVAC Shell	Attic Insulation - Inadequate Insulation - Gas Heating	SF	LI	DI	2,997.7	4%	120.9	0.143	25.0	\$1,744.20	\$1,744.20	0.26	R19 to R60	
9134	HVAC Shell	Attic Insulation - Poor Insulation - Gas Heating	SF	LI	DI	3,135.8	8%	241.1	0.225	25.0	\$1,550.40	\$1,550.40	0.52	R11 to R49	
9135	HVAC Shell	Wall Sheathing - Gas Heating	SF	N/A	Retrofit	2,939.6	4%	125.1	0.192	25.0	\$2,943.00	\$1,000.00	0.92	R12 polyiso	
9136	HVAC Shell	ENERGY STAR Windows - Gas Heating	SF	N/A	Retrofit	2,939.6	8%	249.6	0.535	25.0	\$13,601.25	\$1,000.00	0.76	U=0.30; SHGC=0.40	
9137	HVAC Shell	Basement Sidewall Insulation - Gas Heating	SF	N/A	Retrofit	2,976.4	1%	36.8	0.036	25.0	\$2,720.00	\$1,000.00	0.48	R0 to R13 sidewall insulation	
9138	HVAC Shell	Floor Insulation Above Crawlspace - Gas Heating	SF	N/A	Retrofit	2,908.9	-1%	-30.7	-0.036	25.0	\$316.20	\$90.00	0.73	R13 floor insulation	
9139	HVAC Shell	ENERGY STAR Door - Gas Heating	SF	N/A	Retrofit	2,939.6	1%	34.6	0.052	25.0	\$388.00	\$120.00	1.25	Fiberglass	
9140	HVAC Shell	Smart Window Coverings - Shade/Blind/Controller/Sensor - Gas Heating_ET	SF	N/A	Retrofit	2,939.6	16%	455.6	0.531	7.0	\$14,875.00	\$1,000.00	0.53	Smart shades	
9141	HVAC Shell	Smart Window Coverings - Film/Transformer - Gas Heating_ET	SF	N/A	Retrofit	2,939.6	16%	455.6	0.531	7.0	\$8,160.75	\$1,000.00	0.53	Smart films	
9142	HVAC Shell	Duct Sealing - Average Sealing - Gas Heating	MF	NLI	Retrofit	2,487.5	26%	638.5	0.484	20.0	\$200.00	\$175.00	6.06	15% to 10% leakage	
9143	HVAC Shell	Duct Sealing - Inadequate Sealing - Gas Heating	MF	NLI	Retrofit	2,631.4	20%	532.0	0.309	20.0	\$350.00	\$300.00	2.41	20% to 15% leakage	
9144	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Gas Heating	MF	NLI	Retrofit	2,796.3	48%	1,342.7	0.788	20.0	\$981.00	\$500.00	3.67	25% to 15% leakage	
9145	HVAC Shell	Wall Insulation - Gas Heating	MF	NLI	Retrofit	2,385.4	9%	222.4	0.221	25.0	\$1,159.20	\$450.00	2.12	R0 to R11 wall insulation	
9146	HVAC Shell	Air Sealing - Average Sealing - Gas Heating	MF	NLI	Retrofit	2,163.0	9%	200.4	0.183	15.0	\$309.69	\$100.00	4.26	10 ACH 60 to 7 ACH 50	
9147	HVAC Shell	Air Sealing - Inadequate Sealing - Gas Heating	MF	NLI	Retrofit	2,390.9	10%	227.9	0.162	15.0	\$479.52	\$100.00	5.01	14 ACH 50 to 10 ACH 50	
9148	HVAC Shell	Air Sealing - Poor Sealing - Gas Heating	MF	NLI	Retrofit	2,758.6	13%	367.7	0.187	15.0	\$479.52	\$100.00	7.43	20 ACH 50 to 14 ACH 50	
9149	HVAC Shell	Attic Insulation - Average Insulation - Gas Heating	MF	NLI	Retrofit	2,163.0	8%	172.1	0.145	25.0	\$1,298.70	\$450.00	0.86	R30 to R60	
9150	HVAC Shell	Attic Insulation - Inadequate Insulation - Gas Heating	MF	NLI	Retrofit	2,203.0	10%	212.1	0.181	25.0	\$1,798.20	\$450.00	1.10	R19 to R60	
9151	HVAC Shell	Attic Insulation - Poor Insulation - Gas Heating	MF	NLI	Retrofit	2,280.4	13%	291.6	0.245	25.0	\$1,598.40	\$450.00	1.51	R11 to R49	
9152	HVAC Shell	Duct Sealing - Average Sealing - Gas Heating	MF	LI	DI	2,487.5	26%	638.5	0.484	20.0	\$200.00	\$200.00	5.30	15% to 10% leakage	
9153	HVAC Shell	Duct Sealing - Inadequate Sealing - Gas Heating	MF	LI	DI	2,631.4	20%	532.0	0.309	20.0	\$350.00	\$350.00	2.06	20% to 15% leakage	

Vectren Electric		Residential Measure Assumptions													
Measure #	Measure	Measure Name	Home Type	Measure Type	Replacement Type	Base Annual Energy	% Savings	Base Annual Savings	Net Annual Savings	Utility Rebate	Net Annual Savings	Payback (Years)	CO2e Reduction (Tons/Year)	Water Savings (Gallons/Year)	
9154	HVAC Shell	Duct Sealing/Insulation - Poor Sealing - Gas Heating	MF	LI	DI	2,796.3	48%	1,342.7	0.788	20.0	\$981.00	\$981.00	1.87	25% to 15% leakage	
9155	HVAC Shell	Wall Insulation - Gas Heating	MF	LI	DI	2,388.4	9%	222.4	0.221	25.0	\$1,159.20	\$1,159.20	0.82	R0 to R11 wall insulation	
9156	HVAC Shell	Air Sealing - Average Sealing - Gas Heating	MF	LI	DI	2,163.0	9%	200.4	0.183	15.0	\$309.69	\$309.69	1.38	10 ACH 50 to 7 ACH 50	
9157	HVAC Shell	Air Sealing - Inadequate Sealing - Gas Heating	MF	LI	DI	2,390.9	10%	227.9	0.162	15.0	\$479.52	\$479.52	1.04	14 ACH 50 to 10 ACH 50	
9158	HVAC Shell	Air Sealing - Poor Sealing - Gas Heating	MF	LI	DI	2,758.6	13%	367.7	0.187	15.0	\$479.52	\$479.52	1.55	20 ACH 50 to 14 ACH 50	
9159	HVAC Shell	Attic Insulation - Average Insulation - Gas Heating	MF	LI	DI	2,163.0	8%	172.1	0.145	25.0	\$1,298.70	\$1,298.70	0.30	R30 to R60	
9160	HVAC Shell	Attic Insulation - Inadequate Insulation - Gas Heating	MF	LI	DI	2,203.0	10%	212.1	0.181	25.0	\$1,798.20	\$1,798.20	0.28	R19 to R60	
9161	HVAC Shell	Attic Insulation - Poor Insulation - Gas Heating	MF	LI	DI	2,290.4	13%	291.6	0.245	25.0	\$1,598.40	\$1,598.40	0.43	R11 to R49	
9162	HVAC Shell	Wall Sheathing - Gas Heating	MF	N/A	Retrofit	2,163.0	9%	203.7	0.190	25.0	\$1,242.00	\$625.00	0.96	R12 polyiso	
9163	HVAC Shell	ENERGY STAR Windows - Gas Heating	MF	N/A	Retrofit	2,163.0	13%	286.7	0.281	25.0	\$6,743.25	\$1,000.00	0.64	U=0.30; SHGC=0.40	
9164	HVAC Shell	Basement Sidewall Insulation - Gas Heating	MF	N/A	Retrofit	2,293.7	2%	43.4	-0.002	25.0	\$2,815.20	\$1,000.00	0.26	R0 to R13 sidewall insulation	
9165	HVAC Shell	Floor Insulation Above Crawlspace - Gas Heating	MF	N/A	Retrofit	2,157.6	-1%	-27.1	-0.019	25.0	\$849.15	\$425.00	0.02	R13 floor insulation	
9166	HVAC Shell	Smart Window Coverings - Shade/Blind/Controller/Sensor - Gas Heating_ET	MF	N/A	Retrofit	2,163.0	16%	335.3	0.258	7.0	\$8,500.00	\$1,000.00	0.28	Smart shades	
9167	HVAC Shell	Smart Window Coverings - Film/Transformer - Gas Heating_ET	MF	N/A	Retrofit	2,163.0	16%	335.3	0.258	7.0	\$4,045.95	\$1,000.00	0.28	Smart films	
10001	Water Heating	Water Heater Wrap	SF	N/A	Retrofit	3,536.2	2%	80.4	0.009	5.0	\$20.00	\$20.00	0.98	Add WH Wrap to reduce standby losses (Electric Only)	
10002	Water Heating	Water Heater Temperature Setback	SF	NLI	Retrofit	733.6	11%	81.5	0.009	15.0	\$6.50	\$6.50	8.11	WH Temp Setback from 135 to 120	
10003	Water Heating	Water Heater Timer	SF	NLI	Retrofit	3,536.2	9%	318.0	0.036	15.0	\$60.00	\$30.00	6.85	Install Timer to turn off at night or other periods (Electric Only)	
10004	Water Heating	Pipe Wrap	SF	NLI	Retrofit	3,536.2	3%	106.1	0.012	15.0	\$1.72	\$1.72	39.87	Adding Pipe Wrap to Uninsulated Pipes	
10005	Water Heating	Heat Pump Water Heater	SF	N/A	MO	3,536.2	67%	2,368.0	0.935	10.0	\$1,000.00	\$300.00	3.59	Heat Pump Water Heater	
10006	Water Heating	Solar Water Heater with Electric Backup	SF	N/A	MO	3,536.2	50%	1,777.0	0.702	10.0	\$9,506.00	\$2,850.00	0.26	Solar WH (EF=1.8)	
10007	Water Heating	Smart Water Heater - Tank Controls and Sensors_ET	SF	N/A	Retrofit	3,536.2	15%	530.0	0.209	10.0	\$120.00	\$60.00	4.26	Smart WH Controls	
10008	Water Heating	Bathroom Aerator 1.0 gpm	SF	NLI	Retrofit	49.8	47%	23.6	2.153	10.0	\$0.52	\$0.52	20.53	1.0 GPM Bathroom FA	
10009	Water Heating	Kitchen Flip Aerator 1.5 gpm	SF	NLI	Retrofit	396.6	39%	152.8	2.114	10.0	\$1.34	\$1.34	43.53	1.5 GPM Kitchen FA	
10010	Water Heating	Low Flow Showerhead 1.5 gpm	SF	NLI	Retrofit	611.2	43%	262.6	6.429	10.0	\$3.32	\$3.32	31.13	1.5 GPM Low Flow Showerhead	
10011	Water Heating	Thermostatic Restrictor Shower Valve	SF	N/A	Retrofit	611.2	11%	69.7	2.302	10.0	\$30.00	\$15.00	1.93	Thermostatic Restrictor Shower Valve (on base flow device)	
10012	Water Heating	Shower Timer	SF	N/A	Retrofit	611.2	9%	53.6	0.321	2.0	\$5.00	\$5.00	1.28	Shower Timer limit time to 5 mins (per shower)	
10013	Water Heating	Drain water Heat Recovery	SF	N/A	Retrofit	3,536.2	25%	884.0	0.101	20.0	\$742.00	\$225.00	3.14	Drainpipe heat exchanger	
10014	Water Heating	Desuperheater	SF	N/A	Retrofit	3,536.2	44%	1,556.0	0.178	25.0	\$620.00	\$185.00	7.69	Install Desuperheater (Paid with GSHP)	
10015	Water Heating	Bathroom Aerator 1.0 gpm	SF	LI	DI	49.8	47%	23.6	2.153	10.0	\$0.52	\$0.52	20.53	1.0 GPM Bathroom FA	
10016	Water Heating	Kitchen Flip Aerator 1.5 gpm	SF	LI	DI	396.6	39%	152.8	2.114	10.0	\$1.34	\$1.34	43.53	1.5 GPM Kitchen FA	

Vectren Electric Residential Measure Assumptions

Measure #	Category	Measure Name	Base Price	Measure Type	Requirement Type	Base Demand (kWh/yr)	% of Base Demand	Per Unit Savings (\$/yr)	Per Unit Savings (kWh/yr)	Per Unit Peak Demand (kW)	Per Unit Peak Demand (\$/yr)	Per Unit Peak Demand (kW)	Per Unit Peak Demand (\$/yr)	Per Unit Peak Demand (kW)	Measure Description
10017	Water Heating	Low Flow Showerhead 1.5 gpm	SF	LI	DI	611.2	43%	262.6	6,429	10.0	\$3.32	\$3.32	31.13	1.5 GPM Low Flow Showerhead	
10018	Water Heating	Pipe Wrap	SF	LI	DI	3,536.2	3%	106.1	0.012	15.0	\$1.72	\$1.72	39.87	Adding Pipe Wrap to Uninsulated Pipes	
10019	Water Heating	Water Heater Temperature Setback	SF	LI	DI	733.6	11%	81.5	0.009	15.0	\$6.50	\$6.50	8.11	WH Temp Setback from 135 to 120	
10020	Water Heating	Water Heater Temperature Setback	SF	N/A	NC	733.6	11%	81.5	0.009	15.0	\$6.50	\$6.50	8.11	WH Temp Setback from 135 to 120	
10021	Water Heating	Water Heater Timer	SF	N/A	NC	3,536.2	9%	318.0	0.036	15.0	\$60.00	\$30.00	6.85	Install Timer to turn off at night or other periods (Electric Only)	
10022	Water Heating	Pipe Wrap	SF	N/A	NC	3,536.2	3%	106.1	0.012	15.0	\$1.72	\$1.72	39.87	Adding Pipe Wrap to Uninsulated Pipes	
10023	Water Heating	Heat Pump Water Heater	SF	N/A	NC	3,536.2	67%	2,368.0	0.935	10.0	\$1,000.00	\$300.00	3.59	Heat Pump Water Heater	
10024	Water Heating	Solar Water Heater with Electric Backup	SF	N/A	NC	3,536.2	50%	1,777.0	0.702	10.0	\$9,506.00	\$2,850.00	0.26	Solar WH (EF=1.8)	
10025	Water Heating	Smart Water Heater - Tank Controls and Sensors_ET	SF	N/A	NC	3,536.2	15%	530.0	0.209	10.0	\$120.00	\$60.00	4.26	Smart WH Controls	
10026	Water Heating	Bathroom Aerator 1.0 gpm	SF	N/A	NC	49.8	47%	23.6	2.153	10.0	\$0.52	\$0.52	20.53	1.0 GPM Bathroom FA	
10027	Water Heating	Kitchen Flip Aerator 1.5 gpm	SF	N/A	NC	396.6	39%	152.8	2.114	10.0	\$1.34	\$1.34	43.53	1.5 GPM Kitchen FA	
10028	Water Heating	Low Flow Showerhead 1.5 gpm	SF	N/A	NC	611.2	43%	262.6	6,429	10.0	\$3.32	\$3.32	31.13	1.5 GPM Low Flow Showerhead	
10029	Water Heating	Thermostatic Restrictor Shower Valve	SF	N/A	NC	611.2	11%	69.7	2.302	10.0	\$30.00	\$15.00	1.93	Thermostatic Restrictor Shower Valve (on base flow device)	
10030	Water Heating	Shower Timer	SF	N/A	NC	611.2	9%	53.6	0.321	2.0	\$5.00	\$5.00	1.28	Shower Timer limit time to 5 mins (per shower)	
10031	Water Heating	Drain water Heat Recovery	SF	N/A	NC	3,536.2	25%	884.0	0.101	20.0	\$742.00	\$225.00	3.14	Drainpipe heat exchanger	
10032	Water Heating	Desuperheater	SF	N/A	NC	3,536.2	44%	1,556.0	0.178	25.0	\$620.00	\$185.00	7.69	Install Desuperheater (Paid with GSHP)	
10033	Water Heating	Water Heater Wrap	MF	N/A	Retrofit	2,662.9	2%	60.5	0.007	5.0	\$20.00	\$20.00	0.74	Add WH Wrap to reduce standby losses (Electric Only)	
10034	Water Heating	Water Heater Temperature Setback	MF	NLI	Retrofit	733.6	11%	81.5	0.009	15.0	\$6.50	\$6.50	8.11	WH Temp Setback from 135 to 120	
10035	Water Heating	Water Heater Timer	MF	NLI	Retrofit	2,662.9	9%	240.0	0.027	15.0	\$60.00	\$30.00	5.17	Install Timer to turn off at night or other periods (Electric Only)	
10036	Water Heating	Pipe Wrap	MF	NLI	Retrofit	2,662.9	3%	79.9	0.009	15.0	\$1.72	\$1.72	30.03	Adding Pipe Wrap to Uninsulated Pipes	
10037	Water Heating	Heat Pump Water Heater	MF	N/A	MC	2,662.9	58%	1,544.0	0.610	10.0	\$1,000.00	\$300.00	2.27	Heat Pump Water Heater	
10038	Water Heating	Smart Water Heater - Tank Controls and Sensors_ET	MF	N/A	Retrofit	2,662.9	15%	399.0	0.158	10.0	\$120.00	\$60.00	3.21	Smart WH Controls	
10039	Water Heating	Bathroom Aerator 1.0 gpm	MF	NLI	Retrofit	57.2	47%	27.1	2.153	10.0	\$0.52	\$0.52	22.77	1.0 GPM Bathroom FA	
10040	Water Heating	Kitchen Flip Aerator 1.5 gpm	MF	NLI	Retrofit	274.9	39%	105.9	2.114	10.0	\$1.34	\$1.34	31.94	1.5 GPM Kitchen FA	
10041	Water Heating	Low Flow Showerhead 1.5 gpm	MF	NLI	Retrofit	649.6	43%	279.1	6,429	10.0	\$1.34	\$1.34	81.22	1.5 GPM Low Flow Showerhead	
10042	Water Heating	Thermostatic Restrictor Shower Valve	MF	N/A	Retrofit	649.6	11%	74.1	2.446	10.0	\$30.00	\$15.00	2.05	Thermostatic Restrictor Shower Valve (on base flow device)	
10043	Water Heating	Shower Timer	MF	N/A	Retrofit	649.6	9%	56.9	0.321	2.0	\$5.00	\$5.00	1.33	Shower Timer limit time to 5 mins (per shower)	
10044	Water Heating	Drain water Heat Recovery	MF	N/A	Retrofit	2,662.9	25%	666.0	0.076	20.0	\$742.00	\$225.00	2.36	Drainpipe heat exchanger	
10045	Water Heating	Desuperheater	MF	N/A	Retrofit	2,662.9	44%	1,172.0	0.134	25.0	\$620.00	\$185.00	5.80	Install Desuperheater (Paid with GSHP)	
10046	Water Heating	Bathroom Aerator 1.0 gpm	MF	LI	DI	57.2	47%	27.1	2.153	10.0	\$0.52	\$0.52	22.77	1.0 GPM Bathroom FA	
10047	Water Heating	Kitchen Flip Aerator 1.5 gpm	MF	LI	DI	274.9	39%	105.9	2.114	10.0	\$1.34	\$1.34	31.94	1.5 GPM Kitchen FA	
10048	Water Heating	Low Flow Showerhead 1.5 gpm	MF	LI	DI	649.6	43%	279.1	6,429	10.0	\$1.34	\$1.34	81.22	1.5 GPM Low Flow Showerhead	
10049	Water Heating	Pipe Wrap	MF	LI	DI	2,662.9	3%	79.9	0.009	15.0	\$1.72	\$1.72	30.03	Adding Pipe Wrap to Uninsulated Pipes	
10050	Water Heating	Water Heater Temperature Setback	MF	LI	DI	733.6	11%	81.5	0.009	15.0	\$6.50	\$6.50	8.11	WH Temp Setback from 135 to 120	

Vectren Electric Residential Measure Assumptions

Measure #	Measure	Measure Description	Home Type	Income Type	Registration Type	Annual Electric Usage	% Usage Savings	Pre-Data Usage	Pre-Data Savings	Pre-Data Savings (\$/yr)	Measure Cost (\$)	Measure Savings (\$/yr)	IGDP Ratio	Measure Description
10051	Water Heating	Water Heater Temperature Setback	MF	N/A	NC	733.6	11%	81.5	0.009	15.0	\$6.50	\$6.50	8.11	WH Temp Setback from 135 to 120
10052	Water Heating	Water Heater Timer	MF	N/A	NC	2,662.9	9%	240.0	0.027	15.0	\$60.00	\$30.00	5.17	Install Timer to turn off at night or other periods (Electric Only)
10053	Water Heating	Pipe Wrap	MF	N/A	NC	2,662.9	3%	79.9	0.009	15.0	\$1.72	\$1.72	30.03	Adding Pipe Wrap to Uninsulated Pipes
10054	Water Heating	Heat Pump Water Heater	MF	N/A	NC	2,662.9	58%	1,544.0	0.610	10.0	\$1,000.00	\$300.00	2.27	Heat Pump Water Heater
10055	Water Heating	Smart Water Heater - Tank Controls and Sensors_ET	MF	N/A	NC	2,662.9	15%	399.0	0.158	10.0	\$120.00	\$60.00	3.21	Smart WH Controls
10056	Water Heating	Bathroom Aerator 1.0 gpm	MF	N/A	NC	57.2	47%	27.1	2.153	10.0	\$0.52	\$0.52	22.77	1.0 GPM Bathroom FA
10057	Water Heating	Kitchen Flip Aerator 1.5 gpm	MF	N/A	NC	274.9	39%	105.9	2.114	10.0	\$1.34	\$1.34	31.94	1.5 GPM Kitchen FA
10058	Water Heating	Low Flow Showerhead 1.5 gpm	MF	N/A	NC	649.6	43%	279.1	6.429	10.0	\$1.34	\$1.34	81.22	1.5 GPM Low Flow Showerhead
10059	Water Heating	Thermostatic Restrictor Shower Valve	MF	N/A	NC	649.6	11%	74.1	2.446	10.0	\$30.00	\$15.00	2.05	Thermostatic Restrictor Shower Valve (on base flow device)
10060	Water Heating	Shower Timer	MF	N/A	NC	649.6	9%	56.9	0.321	2.0	\$5.00	\$5.00	1.33	Shower Timer limit time to 5 mins (per shower)
10061	Water Heating	Drain water Heat Recovery	MF	N/A	NC	2,662.9	25%	666.0	0.076	20.0	\$742.00	\$225.00	2.36	Drainpipe heat exchanger
10062	Water Heating	Desuperheater	MF	N/A	NC	2,662.9	44%	1,172.0	0.134	25.0	\$620.00	\$185.00	5.80	Install Desuperheater (Paid with GSHP)

- DI: Direct-install
- LI: Low-income
- MF: Multifamily
- MO: Market opportunity
- NC: New Construction
- NLI: Non-low-income
- SF: Single-family

APPENDIX C *DSM Market Potential Study Commercial Measure Detail*

Vectren Electric Commercial Measure Assumptions

Measure #	End Use	Measure Name	% Elec Savings	Req. Elec. Savings	Req. Nat'l. ROR-BW	Payback (Yrs)	Initial Measure Cost	W/C Ratio
1	Interior Lighting	Compact Fluorescent - 2019	67.8%	198.8	0.039	3.0	\$1.20	64.96
2	Interior Lighting	LED Exit Sign	91.3%	206.8	0.021	16.0	\$30.00	10.52
3	Interior Lighting	High Performance T8 (vs RWT8) 4ft	19%	50	0.011	15	\$18.00	4.98
4	Interior Lighting	Wall Mounted Occupancy Sensor	24.0%	335.3	0.000	8.0	\$51.00	4.41
5	Interior Lighting	Fixture Mounted Occupancy Sensor	24%	198	0.000	8	\$91.83	1.45
6	Interior Lighting	Remote Mounted Occupancy Sensor	24%	568	0.000	8	\$101.00	3.78
7	Interior Lighting	High Bay LED vs (Metal Halide 250W)	35%	476	0.104	15	\$200.00	5.65
8	Interior Lighting	High Bay LED vs (Metal Halide 400W)	53%	1,492	0.326	15	\$250.00	14.15
9	Interior Lighting	High performance T5 (replacing T8)	44%	461	0.101	15	\$100.00	8.20
10	Interior Lighting	CFL Hard Wired Fixture - 2019	69%	199	0.044	12	\$37.50	7.94
11	Interior Lighting	CFL High Wattage 31-115 - 2019	55%	383	0.084	3	\$21.00	7.46
12	Interior Lighting	CFL High Wattage 150-199 -2019	58%	1,088	0.238	3	\$57.00	7.80
13	Interior Lighting	Low Bay LED (vs T8HO)	42%	306	0.067	15	\$331.00	1.64
14	Interior Lighting	High Bay LED (vs T8HO)	35%	472	0.103	15	\$482.00	1.74
15	Interior Lighting	LED Screw-In Bulb	51%	149	0.027	15	\$1.20	207.76
16	Interior Lighting	LED Downlight Fixtures	68%	168	0.037	15	\$27.00	11.07
17	Interior Lighting	LED Linear Replacement Lamps	37%	99	0.022	15	\$25.00	7.04
18	Interior Lighting	LED Troffer	38%	106	0.023	15	\$62.00	3.03
19	Interior Lighting	Light Tube	10%	250	0.104	10	\$500.00	0.95
20	Interior Lighting	Central Lighting Controls	10%	4,077	1.000	8	\$103.00	43.51
21	Interior Lighting	Lighting Power Density Reduction (NC)	10%	4,077	1.000	15	\$220.00	45.78
22	Interior Lighting	Switching Controls for Multi-Level Lighting	30%	12,232	3.000	8	\$274.00	49.07
23	Interior Lighting	Smart Advanced Lighting Controls	47%	2	0.001	10	\$1.51	2.63
24	Interior Lighting	Smart Web-based lighting Mgmt System	35%	3	0.001	10	\$1.15	5.41
25	Exterior Lighting	Outdoor LED (< 250W MH)	65%	495	0.101	15	\$238.50	3.01
26	Exterior Lighting	Outdoor LED (> 250W MH)	54%	983	0.201	15	\$592.00	2.41
27	Space Cooling - Unitary / Split	Split System, <65,000 Btu/hr (CEE Tier 1)	13%	143	0.123	15	\$63.00	8.91
28	Space Cooling - Unitary / Split	Split System, <65,000 Btu/hr (CEE Tier 2)	19%	201	0.173	15	\$127.00	6.22
29	Space Cooling - Unitary / Split	Single Package System <65,000 Btu/hr (CEE Tier 1)	7%	66	0.057	15	\$63.00	4.14
30	Space Cooling - Unitary / Split	Single Package System <65,000 Btu/hr (CEE Tier2)	13%	124	0.107	15	\$127.00	3.85
31	Space Cooling - Unitary / Split	<135,000 Btu/hr (CEE Tier 1) (2019- 2022)	8%	86	0.074	15	\$63.00	5.37
32	Space Cooling - Unitary / Split	<135,000 Btu/hr (CEE Tier 2) (2019-2022)	13%	140	0.121	15	\$127.00	4.35
33	Space Cooling - Unitary / Split	<135,000 Btu/hr (CEE Advanced Tier) (2023+)	18%	169	0.146	15	\$127.00	5.24
34	Space Cooling - Unitary / Split	<240,000 Btu/hr (CEE Tier 1) (2019 - 2022)	6%	69	0.060	15	\$63.00	4.31
35	Space Cooling - Unitary / Split	<240,000 Btu/hr (CEE Tier 2) (2019 - 2022)	13%	144	0.125	15	\$127.00	4.47
36	Space Cooling - Unitary / Split	<240,000 Btu/hr (CEE Advanced Tier) (2023+)	17%	163	0.141	15	\$127.00	5.06
37	Space Cooling - Unitary / Split	<760,000 Btu/hr (CEE Tier 1) (2019 -2022)	6%	69	0.060	15	\$19.00	14.37
38	Space Cooling - Unitary / Split	<760,000 Btu/hr (CEE Tier 2) (2019 -2022)	12%	148	0.127	15	\$38.00	15.30
39	Space Cooling - Unitary / Split	<760,000 Btu/hr (CEE Advanced Tier) (2023+)	9%	96	0.083	15	\$38.00	9.93

Vectren Electric		Commercial Measure Assumptions						
Measure #	Measure Description	Measure Name	% of Total	Per Unit	Per Unit	Per Unit	Measure Cost	BCR Ratio
40	Space Cooling - Unitary / Split	Tier 1) (2019 -2022)	3%	44	0.038	15	\$19.00	9.03
41	Space Cooling - Unitary / Split	Tier 2) (2019 -2022)	9%	113	0.097	15	\$38.00	11.70
42	Space Cooling - Unitary / Split	PTAC, <7,000 Btu/hr	8%	106	0.078	15	\$84.00	4.51
43	Space Cooling - Unitary / Split	PTAC ≥7,000 Btu/h and ≤15,000 Btu/hr	11%	162	0.124	15	\$84.00	7.05
44	Space Cooling - Unitary / Split	PTHP, ≥7,000 Btu/hr and ≤15,000 Btu/hr	11%	177	0.130	15	\$84.00	7.52
45	Space Cooling - Unitary / Split	HVAC Tune-up (2019-2022)	15%	164	0.000	3	\$35.00	1.98
46	Space Cooling - Unitary / Split	HVAC Tune-up (2023+)	15%	150	0.000	3	\$35.00	1.80
47	Space Cooling - Unitary / Split	Air Source Heat Pump <65,000 BtuH (CEE Tier 1)	7%	66	0.057	15	\$50.00	1.14
48	Space Cooling - Unitary / Split	Air Source Heat Pump <65,000 BtuH (CEE Tier 2)	13%	124	0.107	15	\$50.00	2.38
49	Space Cooling - Unitary / Split	Btu/hr (CEE Tier 1) (2019-2022)	10%	117	0.101	15	\$50.00	1.99
50	Space Cooling - Unitary / Split	Btu/hr (CEE Tier 1) (2023+)	10%	101	0.088	15	\$50.00	2.08
51	Space Cooling - Unitary / Split	Btu/hr (CEE Tier 1) (2019 -2022)	9%	112	0.097	15	\$50.00	1.94
52	Space Cooling - Unitary / Split	Btu/hr (CEE Tier 1) (2023+)	9%	97	0.083	15	\$50.00	1.76
53	Space Cooling - Unitary / Split	(2019 -2022)	10%	133	0.115	15	\$50.00	2.22
54	Space Cooling - Unitary / Split	(2023+)	10%	113	0.098	15	\$50.00	2.00
55	Space Cooling - Unitary / Split	Ground Source Heat Pump <135,000 Btu/hr	10%	110	0.095	15	\$75.00	1.57
56	Space Cooling - Unitary / Split	Water Source Heat Pump <17,000Btu/hr	13%	147	0.126	15	\$75.00	1.90
57	Space Cooling - Unitary / Split	<135,000Btu/hr	7%	76	0.066	15	\$75.00	1.05
58	Space Cooling - Unitary / Split	Advanced Rooftop Controls	45%	3,034	2.617	9	\$187.50	57.49
59	Space Cooling - Unitary / Split	Commercial/Industrial CO2 Heat Pump	70%	351	0.000	10	\$87.78	5.52
60	Space Cooling - Unitary / Split	Room A/C	4%	16	0.037	9	\$40.00	2.23
61	Space Cooling - Unitary / Split	Cool roof	15%	89	0.045	20	\$88.22	0.65
62	Space Cooling - Unitary / Split	Ceiling Insulation	8%	87	0.044	30	\$68.59	2.34
63	Space Cooling - Unitary / Split	Wall insulation	2%	507	0.136	30	\$8.32	71.55
64	Space Cooling - Unitary / Split	Roof Insulation	8%	24	0.019	30	\$11.36	4.35
65	Space Cooling - Unitary / Split	Destratification Fan	50%	8	-0.007	15	\$7.27	0.51
66	Space Cooling - Unitary / Split	EMS	10%	310	0.014	15	\$0.86	194.09
67	Space Cooling - Unitary / Split	Duct sealing 15% leakage base	5%	19	0.013	18	\$10.85	2.47
68	Space Cooling - Unitary / Split	Integrated Building Design	30%	2	0.000	20	\$0.11	16.35
69	Space Cooling - Unitary / Split	Retrocommissioning	18%	1	0.000	7	\$0.03	12.80
70	Space Cooling - Unitary / Split	Commissioning	13%	1	0.000	7	\$0.12	2.69
71	Space Cooling - Unitary / Split	Commercial Window Film	5%	209	0.050	10	\$35.50	1.94
72	Space Cooling - Unitary / Split	High Performance Glazing	6%	2	0.070	20	\$6.82	8.95
73	Space Cooling - Unitary / Split	Programable Thermostats	10%	945	0.000	4	\$22.44	5.36
74	Space Cooling - Unitary / Split	Cooling	25%	119	0.047	8	\$18.89	3.19
75	Space Cooling - Unitary / Split	Smart Thermostats	8%	660	0.000	10	\$29.75	6.50
76	Space Cooling - Unitary / Split	Smart Cloud-Based Energy Information System (EIS)	8%	89	0.000	10	\$0.61	42.60
77	Space Cooling - Chillers	Air Cooled Chiller <150 tons	13%	318	0.116	20	\$127.00	8.04
78	Space Cooling - Chillers	Air Cooled Chiller ≥150 tons	13%	305	0.112	20	\$127.00	7.28

Vectren Electric		Commercial Measure Assumptions						
Measure #	Measure	Measure Name	% Btu Savings	Base Btu	Net kWh	Payback (Yr)	Measure Cost	WOT Ratio
79	Space Cooling - Chillers	Water Cooled Screw Chiller <150 ton	13%	191	0.070	20	\$177.68	3.46
80	Space Cooling - Chillers	Water Cooled Screw Chiller ≥150 tons and < 300 tons	19%	273	0.100	20	\$127.00	6.91
81	Space Cooling - Chillers	Water Cooled Screw Chiller ≥300 ton	21%	300	0.110	20	\$87.00	11.09
82	Space Cooling - Chillers	Water Cooled Centrifugal Chiller <150 ton	20%	300	0.110	20	\$166.10	5.81
83	Space Cooling - Chillers	tons	27%	410	0.150	20	\$122.87	10.71
84	Space Cooling - Chillers	Water Cooled Centrifugal Chiller ≥300 ton	25%	355	0.130	20	\$92.22	12.37
85	Space Cooling - Chillers	Air Cooled Chiller Tune-up/Diagnostics	8%	187	0.000	5	\$5.66	20.10
86	Space Cooling - Chillers	Water Cooled Chiller/Tune-up/Diagnostics	8%	119	0.000	5	\$5.66	12.78
87	Space Cooling - Chillers	Chilled Water Reset Controls	25%	173	0.030	10	\$681.34	0.39
88	Space Cooling - Chillers	Cool roof	15%	89	0.045	20	\$88.22	0.65
89	Space Cooling - Chillers	Ceiling Insulation	8%	87	0.044	30	\$8.59	2.34
90	Space Cooling - Chillers	Wall insulation	2%	507	0.136	30	\$8.32	71.55
91	Space Cooling - Chillers	Roof Insulation	8%	24	0.019	30	\$11.36	4.35
92	Space Cooling - Chillers	Destratification Fan	50%	8	-0.007	15	\$7.27	0.51
93	Space Cooling - Chillers	EMS	10%	310	0.014	15	\$0.86	194.09
94	Space Cooling - Chillers	Duct sealing 15% leakage base	5%	19	0.013	18	\$10.85	2.47
95	Space Cooling - Chillers	Integrated Building Design	30%	2	0.000	20	\$0.11	16.35
96	Space Cooling - Chillers	Retrocommissioning	16%	1	0.000	7	\$0.03	12.80
97	Space Cooling - Chillers	Commissioning	13%	1	0.000	7	\$0.12	2.69
98	Space Cooling - Chillers	Commercial Window Film	5%	209	0.050	10	\$35.50	1.94
99	Space Cooling - Chillers	High Performance Glazing	6%	2	0.070	20	\$6.82	8.95
100	Space Cooling - Chillers	Programable Thermostats	10%	945	0.000	4	\$22.44	5.36
101	Space Cooling - Chillers	Smart Thermostats	8%	660	0.000	10	\$29.75	6.50
102	Space Cooling - Chillers	Smart Cloud-Based Energy Information System (EIS)	8%	89	0.000	10	\$0.61	42.60
103	Space Heating	PTHP, <7,000 Btu/hr	8%	65	0.100	15	\$84.00	1.12
104	Space Heating	PTHP, ≥7,000 Btu/hr and ≤15,000 Btu/hr	11%	94	0.146	15	\$84.00	1.63
105	Space Heating	Tier 1)	4%	33	0.052	15	\$50.00	1.14
106	Space Heating	Tier 2)	9%	84	0.130	15	\$50.00	2.38
107	Space Heating	System (CEE Tier 1)	6%	57	0.088	15	\$50.00	4.14
108	Space Heating	System (CEE Tier 2)	6%	57	0.088	15	\$50.00	3.85
109	Space Heating	Btu/hr (CEE Tier 1) (2019-2022)	8%	57	0.089	15	\$50.00	1.99
110	Space Heating	Btu/hr (CEE Tier 1) (2023+)	6%	37	0.057	15	\$50.00	2.08
111	Space Heating	Btu/hr (CEE Tier 1) (2019 -2022)	9%	61	0.094	15	\$50.00	1.94
112	Space Heating	Btu/hr (CEE Tier 1) (2023+)	6%	39	0.061	15	\$50.00	1.76
113	Space Heating	(2019 -2022)	9%	61	0.094	15	\$50.00	2.22
114	Space Heating	(2023+)	9%	61	0.094	15	\$50.00	2.00
115	Space Heating	Ground Source Heat Pump <135,000 Btu/hr	10%	61	0.008	15	\$75.00	1.57
116	Space Heating	Water Source Heat Pump < 135,000Btu/hr	13%	68	0.009	15	\$75.00	1.90
117	Space Heating	<135,000Btu/hr	7%	38	0.005	15	\$75.00	1.05

Vectren Electric		Commercial Measure Assumptions						
Measure #	Category	Measure Name	% Energy Savings	Payback (Yr)	Net Present Value (NPV)	Payback (Yr)	Annual Savings Cost	WSP Rate
118	Space Heating	Commercial/Industrial CO2 Heat Pump	70%	189	0.000	10	\$47.22	5.52
119	Space Heating	Cool roof	15%	41	0.021	20	\$88.22	0.65
120	Space Heating	Ceiling Insulation	8%	40	0.020	30	\$58.59	2.34
121	Space Heating	Wall insulation	2%	236	0.063	30	\$8.32	71.55
122	Space Heating	Roof Insulation	8%	11	0.009	30	\$11.36	4.35
123	Space Heating	Destratification Fan	50%	4	-0.003	15	\$7.27	0.51
124	Space Heating	EMS	10%	144	0.007	15	\$0.86	194.09
125	Space Heating	Duct sealing 15% leakage base	5%	9	0.006	18	\$10.85	2.47
126	Space Heating	Integrated Building Design	30%	1	0.000	20	\$0.11	16.35
127	Space Heating	Retrocommissioning	16%	0	0.000	7	\$0.03	12.80
128	Space Heating	Commissioning	13%	0	0.000	7	\$0.12	2.69
129	Space Heating	Commercial Window Film	5%	97	0.023	10	\$35.50	1.94
130	Space Heating	High Performance Glazing	6%	1	0.032	20	\$6.82	8.95
131	Space Heating	Programmable Thermostats	10%	945	0.000	4	\$22.44	5.36
132	Space Heating	Cooling	25%	119	0.047	8	\$18.89	3.19
133	Space Heating	Smart Thermostats	8%	660	0.000	10	\$29.75	6.50
134	Space Heating	Smart Cloud-Based Energy Information System (EIS)	8%	89	0.000	10	\$0.61	42.60
135	Ventilation	VFD Supply and Return Fans, < 2 HP	30%	2,497	0.369	15	\$1,330.00	2.73
136	Ventilation	VFD Supply and Return Fans, <3 to 10 HP	30%	6,242	0.922	15	\$1,622.00	5.59
137	Ventilation	VFD Supply and Return Fans, 11 to 50 HP	30%	37,450	5.530	15	\$3,059.00	17.79
138	Ventilation	Enthalpy Economizer	20%	117	0.000	10	\$400.00	0.30
139	Ventilation	Improved Duct Sealing	23%	70	0.000	18	\$107.91	1.43
140	Ventilation	Electronically-Commutated Permanent Magnet Motors	65%	1,635	0.000	15	\$3,059.00	0.78
141	Ventilation	High Volume Low Speed Fans	50%	8,379	3.067	10	\$4,185.00	4.03
142	Ventilation	VFD Tower Fan	30%	829	0.265	10	\$155.96	5.50
143	Motors	VFD on Chilled Water Pump Motor, 5 HP	15%	28,580	0.000	15	\$1,330.00	31.22
144	Motors	VFD on Chilled Water Pump Motor, 7.5 HP	15%	42,870	0.000	15	\$1,622.00	38.40
145	Motors	VFD on Chilled Water Pump Motor, 20 HP	15%	171,480	0.000	15	\$3,059.00	81.44
146	Motors	High Performance Elevators	80%	12,982	1.406	25	\$54,690.00	0.64
147	Motors	Escalators Motor Efficiency Controllers	30%	5,414.000	0.620	20	\$6,900.00	1.86
148	Other	NEMA Premium Transformer, single-phase	2%	0.163	0.000	30	\$0.24	3.16
149	Other	NEMA Premium Transformer, three-phase	2%	0.244	0.000	30	\$0.18	4.81
150	Other	High Efficiency Transformer, single-phase	2%	0.393	0.000	30	\$0.46	3.56
151	Other	High Efficiency Transformer, three-phase	2%	0	0.000	30	\$0.44	5.50
152	Water Heating	High Efficiency Storage (tank)	0%	9	0.000	15	\$70.00	0.18
153	Water Heating	retrofit	20%	1,284	0.000	5	\$92.90	7.30
154	Water Heating	On Demand (tankless)	7%	7,905	0.000	5	\$1,050.00	3.97
155	Water Heating	dryer	38%	86	0.000	7	\$19.35	3.32
156	Water Heating	Electric dryer	25%	542	0.000	7	\$72.00	5.62

Vectren Electric		Commercial Measure Assumptions						
Measure #	Category	Measure Name	% Savings	Per Unit Savings	Per Unit Cost	Payback (Years)	Annual Savings (\$)	NPV (\$)
157	Water Heating	Gas Dryer	33%	429	0.000	7	\$66.91	4.78
158	Water Heating	Electric Dryer	27%	884	0.000	7	\$93.21	7.08
159	Water Heating	ES Dishwasher, High Temp, Elec Heat, Elec Booster	30%	11,358	0.000	15	\$419.05	39.44
160	Water Heating	ES Dishwasher, High Temp, Gas Heat, Elec Booster	26%	4,862	0.000	15	\$265.03	26.69
161	Water Heating	ES Dishwasher, High Temp, Gas Heat, Gas Booster	15%	1,699	0.000	15	\$115.95	21.32
162	Water Heating	ES Dishwasher, Low Temp, Elec Heat	33%	12,783	0.000	16	\$95.07	205.29
163	Water Heating	ES Dishwasher, Low Temp, Gas Heat	5%	584	0.000	16	\$8.73	102.14
164	Water Heating	Tank Insulation	91%	468	0.000	15	\$2.22	409.25
165	Water Heating	Heat Pump Water Heater	59%	2,124	0.000	10	\$433.00	6.77
166	Cooking	High Efficiency Combination Oven	35%	6,368	0.000	12	\$100.00	77.30
167	Cooking	Induction Cooktop	20%	784	0.000	11	\$3,000.00	0.39
168	Cooking	Electric Energy Star Fryers	17%	3,126	0.000	12	\$275.67	13.76
169	Cooking	Electric Energy Star Steamers, 3-6 pan	57%	9,967	0.000	12	\$3,400.00	3.56
170	Cooking	Energy Star Convection Ovens	16%	1,937	0.000	12	\$388.00	6.06
171	Cooking	Energy Star Griddles	12%	1,909	0.000	12	\$860.00	2.69
172	Cooking	Energy Star Hot Food Holding Cabinet	53%	1,730	0.000	12	\$902.00	2.33
173	Refrigeration	Glass Door Freezer, <15-49 cu ft, Energy Star	43%	3,595	0.000	12	\$166.00	26.26
174	Refrigeration	Glass Door Freezer, 50+ cu ft, Energy Star	45%	9,804	0.000	12	\$407.00	29.21
175	Refrigeration	Solid Door Freezer, <15-49 cu ft, Energy Star	36%	1,489	0.000	12	\$166.00	10.88
176	Refrigeration	Solid Door Freezer, 50+ cu ft, Energy Star	46%	5,322	0.000	12	\$407.00	15.86
177	Refrigeration	Glass Door Refrigerator, <15 - 49 cu ft, Energy Star	36%	828	0.000	12	\$164.00	6.12
178	Refrigeration	Glass Door Refrigerator, 50+ cu ft, Energy Star	35%	1,577	0.000	12	\$249.00	7.68
179	Refrigeration	Solid Door Refrigerator, <15-49 cu ft, Energy Star	38%	635	0.000	12	\$164.00	4.70
180	Refrigeration	Solid Door Refrigerator, 50+ cu ft, Energy Star	48%	1,675	0.000	12	\$249.00	8.16
181	Refrigeration	self contained	7%	537	0.000	1	\$75.00	1.04
182	Refrigeration	contained	7%	1,388	0.000	1	\$75.00	2.68
183	Refrigeration	Anti-sweat heater controls on freezers	55%	2,557	0.000	12	\$200.00	15.50
184	Refrigeration	Anti-sweat heater controls, on refrigerators	55%	1,082	0.000	12	\$200.00	6.56
185	Refrigeration	Vending Miser, Cold Beverage	46%	1,612	0.000	5	\$215.50	3.95
186	Refrigeration	Brushless DC Motors (ECM) for freezers and coolers	44%	1,064	0.000	15	\$177.00	8.73
187	Refrigeration	Humidity Door Heater Controls for freezers and coolers	55%	1,820	0.000	12	\$200.00	11.03
188	Refrigeration	Refrigerated Case Covers	9%	945	0.000	5	\$252.00	1.98
189	Refrigeration	Zero Energy Doors for freezers and coolers	20%	1,360	0.000	10	\$290.00	6.47
190	Refrigeration	Evaporator Coil Defrost Control	30%	197	0.002	10	\$500.00	0.56
191	Refrigeration	Evaporator Fan Motor Control for freezers and coolers	36%	1,524	0.000	16	\$291.00	10.64
192	Refrigeration	Ice Machine, Energy Star, Self-Contained	7%	263	0.000	9	\$56.00	0.51
193	Refrigeration	LED Case Lighting (retrofit)	45%	437	0.000	8	\$250.00	0.19
194	Refrigeration	Efficient Refrigeration Condenser	2%	120	0.000	15	\$35.00	0.50
195	Refrigeration	Efficient low-temp compressor	1%	875	0.000	13	\$552.00	2.74

Vectren Electric		Commercial Measure Assumptions						
Measure #	End Use	Measure Name	% Drive Savings	Base Usage Savings	Base Usage kWh/yr	Payback (Yrs)	Annual Savings Cost	NPV Ratio
196	Compressed Air	Automatic Drains	0%	2,097	0.000	5	\$355.00	4.15
197	Compressed Air	Cycling and High Efficiency Dryers	35%	4	0.000	10	\$6.00	0.93
198	Compressed Air	Efficient Air Compressors	18%	914	0.000	15	\$250.00	5.30
199	Compressed Air	Low Pressure Drop-Filters	3%	65	0.000	10	\$22.00	4.05
200	Compressed Air	Receiver Capacity Addition	10%	9,159	0.000	10	\$2,000.00	6.31
201	Compressed Air	Engineered Nozzles for blow-off	71%	22,230	0.000	15	\$14.00	2304.40
202	Compressed Air	Compressed Air Leak Survey and Repair	50%	496	0.000	1	\$6.00	11.94
203	Office Equipment	Commercial Plug Load - Smart Strip Outlets	18%	23	0.000	8	\$15.00	1.32
204	Office Equipment	Plug Load Occupancy Sensor	15%	169	0.000	8	\$70.00	2.03
205	Office Equipment	Energy Star Compliant Refrigerator	20%	120	0.000	17	\$30.00	6.35
206	Office Equipment	Energy Star Computers	43%	81	0.000	4	\$5.00	9.07
207	Office Equipment	Computer Power Management Software	46%	161	0.000	5	\$29.00	3.91
208	Office Equipment	Energy Star UPS	11%	105	0.000	10	\$1,303.35	0.11
209	Office Equipment	High Efficiency Hand Dryer	69%	965	0.000	10	\$450.00	2.96
210	Office Equipment	Electrically Commutated Plug Fans in data centers	33%	1,445	0.000	15	\$718.00	3.90
211	Office Equipment	High Efficiency CRAC unit	30%	162	0.000	15	\$62.50	5.03
212	Office Equipment	Computer Room Air Conditioner Economizer	47%	358	0.000	15	\$82.00	8.46
213	Office Equipment	Computer Room Hot Aisle Cold Aisle Configuration	13%	125	0.000	15	\$156.00	1.55
214	Office Equipment	Computer Room Air Side Economizer	47%	440	0.000	10	\$25.00	24.30
215	Office Equipment	VFD for Process Fans -CRAC units	43%	2,279	0.000	15	\$200.00	22.07
216	Office Equipment	Vending Miser for Non-Refrig Equip	46%	343	0.000	5	\$108.00	0.34
217	Pools	Heat Pump Pool Heater	61%	5,732	0.000	10	\$4,000.00	1.98
218	Pools	High efficiency spas/hot tubs	15%	375	0.000	10	\$300.00	1.72
219	Pools	VFD Retrofit on Pool Circulation Pump	35%	1,425	0.000	12	\$200.00	11.52
220	Behavioral	Reports)	3%	7,852	0.896	2	\$8.88	271.30
221	Behavioral	Whole-Building Energy Monitoring	10%	2	0.000	2	\$1.00	0.52
222	Behavioral	Energy Use Displays	9%	23,555	2.693	1	\$250.00	14.60

APPENDIX D *DSM Market Potential Study: Industrial Measure Detail*

Vectren Electric		Industrial Measure Assumptions		Energy Savings	Btu (Btu) Savings	Cost (\$/Btu)	Payback (Years)	Annual Savings (\$/yr)	Net Present Value (\$/yr)
101	Appliances, Computers, Office Equipment	Energy Star Compliant Single Door Refrigerator	20.0%	120.0	0.000	17.0	\$39.00	7.38	
102	Appliances, Computers, Office Equipment	Energy Star computers	43.0%	80.5	0.000	4.0	\$5.00	17.76	
103	Appliances, Computers, Office Equipment	Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	15.0%	23.4	0.000	8.0	\$15.00	1.58	
104	Appliances, Computers, Office Equipment	PC Network Energy Management Controls replacing no central control	46.0%	161.0	0.000	5.0	\$29.00	3.24	
106	Appliances, Computers, Office Equipment	Energy Star UPS	10.5%	104.8	0.000	10.0	\$1,303.35	0.13	
107	Appliances, Computers, Office Equipment	High Efficiency CRAC Unit	30.0%	162.3	0.020	15.0	\$62.50	4.96	
151	Water Heating	Heat Pump Water Heater	58.8%	2,123.7	0.000	10.0	\$433.00	5.08	
152	Water Heating	Electric Tankless Water Heater	7.4%	7,905.0	0.000	5.0	\$1,050.00	3.97	
154	Water Heating	High Efficiency Storage (tank)	0.2%	8.6	0.000	15.0	\$70.00	0.18	
168	Water Heating	Tank Insulation (electric)	91.0%	468.0	0.000	15.0	\$2.22	306.25	
169	Water Heating	Drain Water Heat Recovery Water Heater	25.0%	546.0	4.490	25.0	\$631.00	2.30	
171	Water Heating	Process Cooling Condenser Heat Recovery	33.0%	5,720.0	1.205	15.0	\$284.00	49.23	
301	Envelope	Integrated Building Design	40.0%	2.0	0.000	15.0	\$0.27	9.99	
302	Envelope	Energy Efficient Windows	13.9%	2.0	0.022	20.0	\$17.04	8.95	
302	Envelope	Energy Efficient Windows	13.9%	2.0	0.022	20.0	\$17.04	8.95	
303	Envelope	Cool Roofing	15.0%	61.3	0.028	20.0	\$332.44	0.39	
304	Envelope	Ceiling Insulation	8.0%	65.5	0.024	20.0	\$47.16	1.46	
305	Envelope	Window Improvements	0.7%	85.3	0.033	15.3	\$286.16	0.24	
306	Envelope	Wall Insulation	1.7%	364.8	0.076	20.0	\$4.57	85.75	
307	Envelope	Roof Insulation	0.8%	22.1	0.014	20.0	\$54.88	2.70	
308	Envelope	Improved Duct Sealing	1.4%	37.6	0.019	18.0	\$107.91	1.51	
321	Ventilation	Economizer	12.0%	136.6	0.001	12.5	\$123.00	0.98	
327	Ventilation	EMS for Manufacturing HVAC Fan	44.0%	2,197.0	0.250	15.0	\$800.00	10.16	
328	Ventilation	VFD supply and return fans, <3 to 10 hp	30.0%	6,241.7	0.522	15.0	\$2,852.00	7.57	
329	Ventilation	VFD supply and return fans, 11 to 50 hp	30.0%	37,450.0	5.530	15.0	\$12,699.00	24.08	
332	Ventilation	High Volume Low Speed Fans	50.0%	8,379.0	3.067	10.0	\$4,197.75	3.99	
333	Ventilation	Engineered CKV Hood	42.8%	727.2	0.288	15.0	\$124.62	187.25	
341	Space Cooling - Chillers	Air-Cooled Chiller, <160 ton	13.1%	318.0	0.086	20.0	\$2,540.00	8.04	
343	Space Cooling - Chillers	Water Side Economizer	10.0%	1,047.5	0.000	15.0	\$50.00	7.75	
345	Space Cooling - Chillers	Water-Cooled Chiller > 300 ton	25.0%	355.1	0.096	20.0	\$92.22	11.09	
348	Space Cooling - Chillers	Water-Cooled Chiller < 150 ton	20.0%	300.5	0.081	20.0	\$166.10	5.81	
350	Space Cooling - Chillers	Chiller Tune Up	8.0%	119.1	0.632	5.0	\$5.66	12.78	
362	HVAC Controls	Programmable Thermostats	10.0%	945.3	0.000	4.0	\$56.09	6.36	
363	HVAC Controls	EMS install	10.0%	310.4	0.014	15.0	\$4.71	115.04	
364	HVAC Controls	EMS Optimization	0.5%	358.9	0.041	20.0	\$37.62	0.00	
365	HVAC Controls	HVAC Occupancy Sensors	19.0%	99.3	0.076	15.0	\$107.58	0.00	
367	HVAC Controls	Zoning	0.0%	187.4	0.000	15.0	\$900.00	0.00	
368	HVAC Controls	Setback with Electric Heat	10.0%	3,451.6	0.000	9.0	\$71.00	0.00	
369	HVAC Controls	EMS Pump Scheduling	10.0%	1,524.4	0.280	15.0	\$1.32	0.00	
370	HVAC Controls	Web Enabled EMS	10.0%	670.8	-0.098	15.0	\$19.10	0.00	
371	HVAC Controls	Retrocommissioning	9.0%	0.9	0.000	7.0	\$0.08	7.54	
382	Space Cooling - Unitary and Split AC	DX Packaged System >65000 Btu/h CEE Tier 1	18.2%	86.0	0.055	15.0	\$63.00	5.37	
384	Space Cooling - Unitary and Split AC	Split System, <65,000 Btu/hr (CEE Tier 1)	12.3%	142.6	0.091	15.0	\$897.32	8.91	
385	Space Cooling - Unitary and Split AC	Ground Source Heat Pump - Cooling	4.9%	110.3	0.012	15.0	\$75.00	1.57	
387	Space Cooling - Unitary and Split AC	Water Loop Heat Pump (WLHP) - Cooling	11.5%	146.5	0.094	15.0	\$75.00	1.90	
391	Space Cooling - Unitary and Split AC	HVAC Tune-up	6.8%	58.6	0.079	3.0	\$32.40	1.48	
401	Cooking	HE Steamer	56.6%	9,966.7	0.000	12.0	\$3,400.00	3.56	
402	Cooking	HE Combination Oven	34.8%	6,397.9	0.000	12.0	\$100.00	77.30	
403	Cooking	HE Convection Ovens	16.1%	1,937.1	0.000	12.0	\$388.00	6.06	
404	Cooking	HE Holding Cabinet	52.7%	1,730.0	0.000	12.0	\$902.00	2.33	
405	Cooking	HE Fryer	17.2%	3,126.0	0.000	12.0	\$275.67	13.76	
406	Cooking	HE Griddle	12.1%	1,909.1	0.000	12.0	\$860.00	2.69	
408	Cooking	Induction Cooktops	20.0%	784.0	0.000	11.0	\$3,000.00	0.29	
506	Lighting	High performance TS (replacing T8)	22.4%	461.1	0.094	15.0	\$100.00	8.19	
507	Lighting	Outdoor LED (>250 W MH)	56.9%	983.3	0.201	15.0	\$592.00	3.01	
509	Lighting	LED Exit Sign	81.8%	88.6	0.012	16.0	\$30.00	10.52	
512	Lighting	LED High Bay Lighting	35.0%	471.9	0.096	15.0	\$482.00	1.74	
513	Lighting	LED Low Bay Lighting	42.6%	309.0	0.062	15.0	\$331.00	1.64	
514	Lighting	Light Tube	10.0%	250.0	0.104	10.0	\$500.00	0.95	
515	Lighting	High bay 4 lamp HPT8 vs (Metal halide 250 W)	50.1%	677.0	0.138	15.0	\$200.00	4.69	
522	Lighting	CFL Hard Wired Fixture	69.0%	199.0	0.041	12.0	\$37.50	7.94	
523	Lighting	Compact Fluorescent	67.8%	198.8	0.036	2.5	\$1.20	64.96	
524	Lighting	LED Screw In Bulb	63.9%	253.5	0.043	15.0	\$1.20	207.76	
528	Lighting	LED Downlight	66.2%	168.1	0.034	15.0	\$27.00	11.07	
529	Lighting	LED Troffer	25.1%	58.3	0.012	15.0	\$62.00	3.03	
536	Lighting	LED Linear Replacement Lamps	28.3%	61.2	0.012	16.0	\$25.00	7.04	
549	Lighting	SEM	2.3%	36.6	0.001	1.0	\$1.00	4.67	
551	Lighting Controls	Smart Advanced Lighting Controls	40.0%	2.2	0.001	10.0	\$3.02	1.98	
552	Lighting Controls	Smart Web Based Lighting Controls	28.5%	3.5	0.001	10.0	\$2.30	4.05	
557	Lighting Controls	Wall Occupancy Sensor	24.0%	335.0	0.068	8.0	\$51.00	4.41	
559	Lighting Controls	Central Lighting Control	10.0%	4,077.3	0.704	8.0	\$103.00	43.51	
560	Lighting Controls	Switching Controls for Multilevel Lighting (Non-HID)	20.0%	8,154.6	1.407	8.0	\$274.00	49.07	
561	Lighting Controls	Lighting Power Density - Interior	10.0%	4,077.3	0.704	15.0	\$220.00	34.34	
601	Refrigeration	Vending Miser for Soft Drink Vending Machines	46.0%	1,611.8	0.000	5.0	\$215.50	3.95	
602	Refrigeration	Refrigerated Case Covers	6.0%	2,900.0	0.331	4.0	\$150.00	9.53	
603	Refrigeration	Refrigeration Economizer	30.0%	166.7	-0.001	15.0	\$126.76	1.18	
606	Refrigeration	Commercial Ice-makers	6.8%	263.1	0.041	9.0	\$55.00	1.22	
607	Refrigeration	Evaporator Fan Motor Controls on S-P motors	25.1%	1,155.0	0.119	5.0	\$300.00	2.23	
608	Refrigeration	Evaporator Fan Motor Controls on PSC motors	25.0%	796.0	0.082	5.0	\$300.00	1.54	
609	Refrigeration	Evaporator Fan Motor Controls on ECM motors	38.8%	1,524.0	0.174	16.0	\$99.00	7.98	
610	Refrigeration	H.E. Evaporative Fan Motors	30.0%	773.2	0.088	15.0	\$60.00	18.59	
611	Refrigeration	Zero-Energy Doors	20.0%	1,800.0	0.151	10.0	\$290.00	6.03	
612	Refrigeration	Door Heater Controls	55.0%	1,082.6	0.000	12.0	\$200.00	11.03	

Vectren Electric		Industrial Measure Assumptions						
Measure #	Measure Name	Measure Description	% of Total Savings	Peak Demand Savings (kW)	Peak Demand Savings (\$/yr)	Annual Energy Savings (kWh)	Annual Energy Savings (\$/yr)	
613	Refrigeration	Discus and Scroll Compressors	7.8%	1,900.0	0.220	13.0	\$825.00	
614	Refrigeration	Floating Head Pressure Control	9.2%	1,264.0	0.000	15.0	\$90.00	
619	Refrigeration	ENERGY STAR Commercial Solid Door Refrigerators	38.3%	636.0	0.000	12.0	\$164.00	
620	Refrigeration	ENERGY STAR Commercial Solid Door Freezers	35.8%	1,489.0	0.000	12.0	\$166.00	
621	Refrigeration	ENERGY STAR Commercial Glass Door Refrigerators	30.2%	754.0	0.086	12.0	\$600.00	
622	Refrigeration	ENERGY STAR Commercial Glass Door Freezers	33.7%	3,671.0	0.419	12.0	\$450.00	
623	Refrigeration	Strip Curtains	80.2%	269.5	0.028	4.0	\$7.50	
624	Refrigeration	Efficient Refrigeration Condenser	1.8%	120.0	0.000	15.0	\$35.00	
625	Refrigeration	Door Gaskets - Cooler and Freezer	89.7%	98.0	0.011	4.0	\$2.25	
626	Refrigeration	Reach-in Refrigerated display case door retrofit	43.0%	1,014.0	0.185	12.0	\$670.00	
627	Refrigeration	LED Case Lighting	45.5%	437.5	0.000	8.0	\$250.00	
628	Refrigeration	ECM case fan motors	8.8%	1,064.0	0.121	15.0	\$177.00	
629	Refrigeration	Efficient low-temp compressor	1.1%	283.5	0.048	13.0	\$52.00	
630	Refrigeration	Automatic High Speed Doors - between freezer and cooler	15.0%	988.3	0.110	12.0	\$150.00	
631	Refrigeration	Refrigerant charging correction	14.0%	77.7	0.080	2.0	\$10.35	
801	Space Heating	PTHP, 1 ton	23.2%	94.3	0.108	15.0	\$84.00	
803	Space Heating	Ground Source Heat Pump - Heating	4.9%	22.7	0.014	15.0	\$375.00	
805	Space Heating	Water Loop Heat Pump (WLHP) - Heating	11.5%	67.9	0.129	15.0	\$75.00	
901	Other	High Efficiency Transformer, single-phase	2.5%	0.4	0.000	30.0	\$0.46	
902	Other	NEMA Premium Transformer, single-phase	2.5%	0.2	0.000	30.0	\$0.24	
903	Other	NEMA Premium Transformer, three-phase	2.5%	0.2	0.000	30.0	\$0.18	
909	Other	High Efficiency Transformer, three-phase	2.5%	0.4	0.000	30.0	\$0.44	
911	Other	Parking Garage Exhaust Fan CO Control	48.0%	2,413.0	0.275	15.0	\$1,800.00	
912	Other	Optimized Snow and Ice Melt Controls	92.0%	0.1	0.000	15.0	\$15.15	
913	Other	Engine Block Heater Timer	64.0%	576.0	0.800	5.0	\$50.00	
1001	Machine Drive	Sensors & Controls	3.0%	1.0	0.000	15.0	\$0.01	
1002	Machine Drive	Compressed Air Outdoor Air Intake	2.2%	109.8	0.015	20.0	\$5.00	
1003	Machine Drive	Electric Supply System Improvements	3.0%	1.0	0.000	15.0	\$0.01	
1004	Machine Drive	Advanced Efficient Motors	2.3%	1.0	0.000	20.0	\$0.04	
1005	Machine Drive	Industrial Motor Management	1.0%	1.0	0.000	5.0	\$0.02	
1006	Machine Drive	Compressed Air Low Pressure Drop Filters	1.3%	64.7	0.010	10.0	\$22.00	
1007	Machine Drive	Motor System Optimization (Including ASD)	19.0%	1.0	0.000	15.0	\$0.01	
1008	Machine Drive	Pump System Efficiency Improvements	16.4%	1.0	0.000	15.0	\$0.01	
1009	Machine Drive	Fan System Improvements	6.0%	1.0	0.000	15.0	\$0.02	
1010	Machine Drive	Efficient Air Compressors	18.0%	957.6	0.130	14.0	\$177.78	
1011	Machine Drive	Compressed Air Pressure Flow Controller	1.5%	73.0	0.010	15.0	\$25.00	
1012	Machine Drive	VFD for Process Fans	28.0%	707.0	0.000	15.0	\$46.00	
1013	Machine Drive	VFD for Process Pumps	29.0%	1,082.0	0.000	15.0	\$94.00	
1014	Machine Drive	High Efficiency Pumps	7.4%	201.0	0.000	15.0	\$31.00	
1015	Machine Drive	Compressed Air Audits and Leak Repair	8.0%	496.1	0.069	1.0	\$8.00	
1016	Machine Drive	Compressed Air replacement with Air Blowers	8.5%	6,587.7	4.180	15.0	\$620.00	
1017	Machine Drive	Compressed Air Automatic Drains	2.2%	2,097.0	0.332	5.0	\$100.00	
1018	Machine Drive	Compressed Air Storage Tank	8.5%	423.0	0.059	20.0	\$36.00	
1019	Machine Drive	Compressed Air High Efficiency Dryers	1.0%	48.0	0.000	15.0	\$10.00	
1020	Machine Drive	Compressed Air Nozzles	7.5%	21,142.0	6.340	20.0	\$76.75	
1026	Process Cooling & Refrig	Sensors & Controls	3.0%	1.0	0.000	15.0	\$0.01	
1027	Process Cooling & Refrig	Energy Information System	1.0%	1.0	0.000	15.0	\$0.06	
1028	Process Cooling & Refrig	Electric Supply System Improvements	3.0%	1.0	0.000	15.0	\$0.01	
1029	Process Cooling & Refrig	Improved Refrigeration	10.0%	1.0	0.000	15.0	\$0.00	
1031	Process Heating	Sensors & Controls	3.0%	1.0	0.000	15.0	\$0.01	
1032	Process Heating	Energy Information System	1.0%	1.0	0.000	15.0	\$0.06	
1033	Process Heating	Electric Supply System Improvements	3.0%	1.0	0.000	15.0	\$0.01	
1034	Process Heating	Decrease Oven Exhaust Flow	60.0%	399.0	0.087	20.0	\$1.00	
1041	Industrial Other	High Efficiency Welders	12.0%	761.0	0.390	20.0	\$200.00	
1042	Industrial Other	3 Phase High Eff Battery Charger	8.0%	2,895.0	0.289	20.0	\$872.50	
1043	Industrial Other	Barrel Insulation - Inj. Molding (plastics)	18.0%	1,210.0	0.291	10.0	\$80.00	
1044	Industrial Other	Pellet Dryer Insulation (plastics)	17.0%	185.0	0.100	10.0	\$40.00	
1045	Industrial Other	Injection Molding Machine - efficient (plastics)	51.0%	223.0	0.050	20.0	\$125.00	
1047	Industrial Other	Dewpoint Sensor Control for Dessiccant Plastic Dryer	8.5%	565.0	0.100	15.0	\$150.00	
1051	Agriculture	Other Industrial -Low-Energy Livestock Waterer	47.7%	1,933.0	1.000	10.0	\$788.00	
1052	Agriculture	Other Industrial -Dairy Refrigerator Tune-Up	4.0%	0.1	0.000	5.0	\$0.05	
1053	Agriculture	Greenhouse Environmental Controls	10.0%	98.0	0.000	15.0	\$125.00	
1054	Agriculture	Scroll Compressor with Heat Exchanger for Dairy Refrigeration	10.5%	190.0	0.000	15.0	\$1,500.00	
1055	Agriculture	Variable Speed Drive with Heat Exchanger, Milk	15.0%	878.0	0.000	15.0	\$2,725.00	
1056	Agriculture	Milk Pre-Cooler Heat Exchanger	60.0%	1.0	0.000	15.0	\$0.15	
1057	Agriculture	Variable Speed Drives for Dairy Vacuum Pumps	34.8%	596.0	0.000	10.0	\$250.00	
1058	Agriculture	VFD for Process Fans - Agriculture	23.0%	520.0	0.000	15.0	\$46.00	
1059	Agriculture	VFD for Process Pumps - Agriculture	43.0%	290.0	0.000	15.0	\$46.00	
1050	Agriculture	VFD for Process Pumps - Irrigation	43.0%	195.0	0.000	10.0	\$46.00	
1061	Agriculture	Grain Storage Temperature and Moisture Management Controller	49.0%	349.0	0.000	15.0	\$233.00	
1062	Agriculture	Low Pressure Sprinkler Nozzles	15.0%	5.0	0.000	15.0	\$1.00	
1063	Agriculture	Fan Thermostat Controller	53.4%	1,586.0	0.000	15.0	\$50.00	
1064	Agriculture	LED Poultry Lights	57.4%	5.8	0.001	9.0	\$1.53	
1065	Agriculture	Long Daylighting Dairy	30.0%	6.2	0.001	16.0	\$1.79	
1066	Agriculture	Evaporator Fan Motor Controls Ag	35.4%	537.1	0.270	20.0	\$30.13	

APPENDIX E DSM Market Potential Study Commercial Opt-Out Results

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

E.1 SCOPE OF MEASURES & END USES ANALYZED

There were 222 total electric measures included in the analysis. Table E-1 provides the number of measures by end-use and fuel type (the full list of commercial measures is provided in Appendix C). The measure list was developed based on a review of current Vectren 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 E-1 COMMERCIAL ENERGY EFFICIENCY MEASURES – BY FUEL TYPE

End-Use	Number of Unique Measures
Space Heating	32
Cooling	76
Ventilation	8
Water Heating	14
Lighting	26
Cooking	7
Refrigeration	23
Office Equipment	14
Behavioral	3
Other	19

E.2 COMMERCIAL ELECTRIC POTENTIAL

Figure E-1 provides the technical, economic, MAP and RAP results for the 6-year, 10-year, and 20-year timeframes. The 6-year technical potential is 22.2% of forecasted sales, and the economic potential is 20.0% of forecasted sales. The 6-year MAP is 14.8% and the RAP is 6.3%.

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

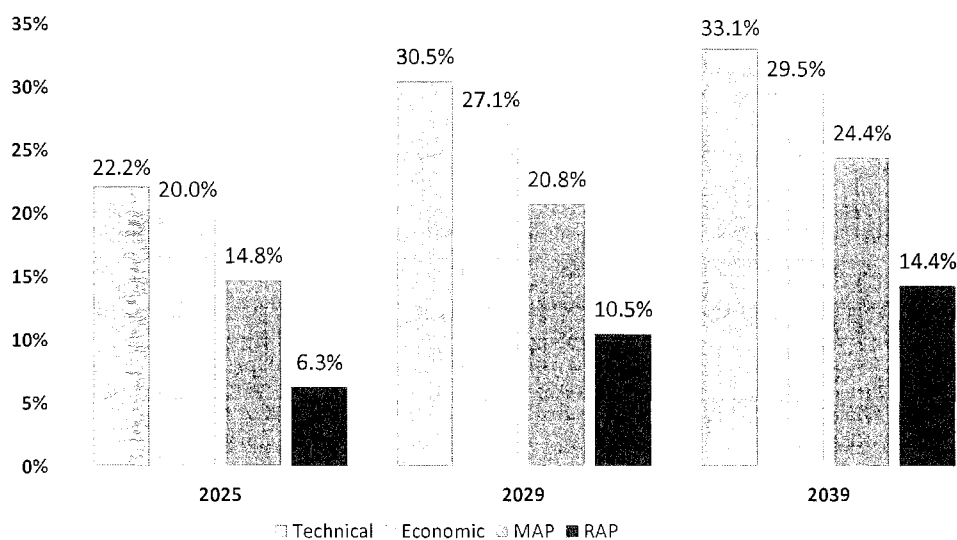


Table E-2 provides cumulative annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The RAP reaches 6.3% after six years.

TABLE E-2 COMMERCIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	50,170	101,739	156,928	213,761	267,250	316,621
Economic	46,545	93,832	143,992	195,103	242,328	285,256
MAP	29,659	62,928	99,777	138,516	176,072	210,908
RAP	11,578	24,685	39,512	55,740	72,884	90,391
Forecasted Sales	1,390,224	1,392,929	1,400,166	1,408,787	1,421,633	1,428,202
Percentage						
Technical	3.6%	7.3%	11.2%	15.2%	18.8%	22.2%
Economic	3.3%	6.7%	10.3%	13.8%	17.0%	20.0%
MAP	2.1%	4.5%	7.1%	9.8%	12.4%	14.8%
RAP	0.8%	1.8%	2.8%	4.0%	5.1%	6.3%

Table E-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 0.8% to 1.4% per year over the next six years.

TABLE E-3 COMMERCIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	50,170	54,751	59,038	61,705	61,577	62,517
Economic	46,545	50,469	53,966	55,928	55,202	55,716
MAP	29,659	34,334	38,719	41,744	42,354	43,062
RAP	11,578	13,618	15,630	17,541	18,846	20,006
Forecasted Sales	1,390,224	1,392,929	1,400,166	1,408,787	1,421,633	1,428,202
Percentage						
Technical	3.6%	3.9%	4.2%	4.4%	4.3%	4.4%
Economic	3.3%	3.6%	3.9%	4.0%	3.9%	3.9%
MAP	2.1%	2.5%	2.8%	3.0%	3.0%	3.0%
RAP	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%

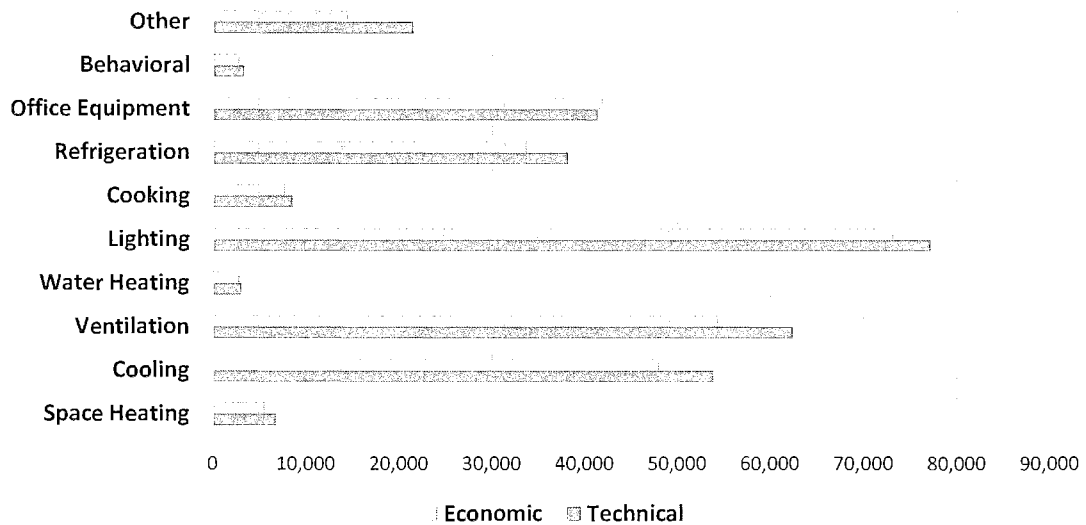
Technical & Economic Potential

Table E-4 provides cumulative annual technical and economic potential results from 2020-2025. Figure E-2 shows a comparison of the technical and economic potential (6-year) by end use. Lighting, Ventilation, and Cooling are the leading stand-alone end uses among technical and economic potential.

TABLE E-4 TECHNICAL & ECONOMIC COMMERCIAL ELECTRIC POTENTIAL

	2020	2021	2022	2023	2024	2025
Energy (MWh)						
Technical	50,170	101,739	156,928	213,761	267,250	316,621
Economic	46,545	93,832	143,992	195,103	242,328	285,256
Peak Demand (MW)						
Technical	7	13	20	28	34	40
Economic	5	10	16	21	27	32

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



Maximum Achievable Potential

Figure E-3 illustrates the cumulative annual MAP results by end use across the 2020-2025 timeframe. Like technical and economic potential, Lighting, Ventilation, and Cooling are the leading end uses. Refrigeration and Office Equipment also have significant maximum achievable potential.

FIGURE E-3 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) MAP POTENTIAL BY END-USE

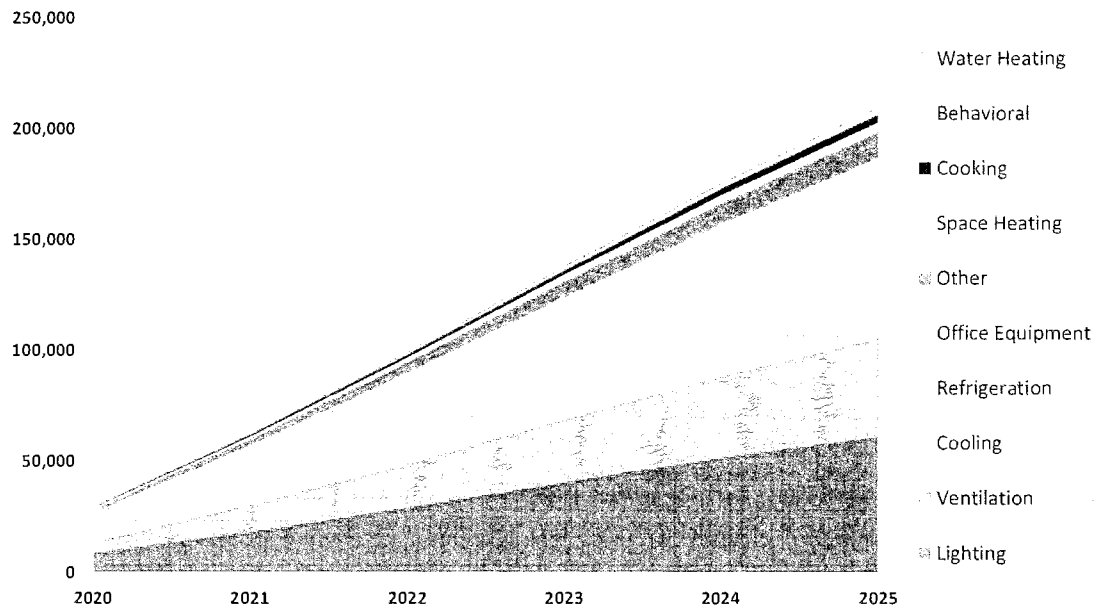


Table E-5 provides the incremental and cumulative annual MAP across the 2020-2025 timeframe. The incremental MAP ranges from 2.1% to 3.0% of forecasted sales across the six-year timeframe. Cumulative annual MAP rises to 14.8% by 2025.

TABLE E-5 COMMERCIAL ELECTRIC MAP BY END-USE

End Use	2020	2021	2022	2023	2024	+ 2025
Incremental Annual MWh						
Space Heating	632	738	812	825	779	690
Cooling	5,164	5,873	6,459	7,175	7,250	6,886
Ventilation	5,703	6,840	7,891	8,528	8,447	7,669
Water Heating	156	204	254	300	336	374
Lighting	8,277	9,662	10,844	11,386	10,957	9,665
Cooking	323	431	548	663	770	863
Refrigeration	4,216	4,939	5,477	5,745	5,754	6,593
Office Equipment	3,624	3,446	3,308	3,275	3,394	5,201
Behavioral	226	297	600	761	1,176	1,437
Other	1,336	1,903	2,525	3,086	3,491	3,684
Total	29,659	34,334	38,719	41,744	42,354	43,062
% of Forecasted Sales	2.1%	2.5%	2.8%	3.0%	3.0%	3.0%
Incremental Annual MW						
Total	2.4	2.9	3.3	3.5	3.5	3.3
% of Forecasted Demand	0.7%	0.9%	1.0%	1.0%	1.0%	1.0%
Cumulative Annual MWh						
Space Heating	632	1,371	2,183	3,008	3,787	4,477
Cooling	5,164	11,037	17,496	24,217	30,902	37,118
Ventilation	5,703	12,543	20,434	28,962	37,409	45,078
Water Heating	156	361	615	914	1,250	1,608
Lighting	8,277	17,939	28,784	40,169	51,127	60,791
Cooking	323	755	1,302	1,965	2,735	3,598
Refrigeration	4,216	8,357	12,760	17,138	21,249	24,958
Office Equipment	3,624	7,070	10,378	13,653	16,245	19,000
Behavioral	226	509	866	1,307	1,855	2,498
Other	1,336	2,986	4,960	7,183	9,513	11,783
Total	29,659	62,928	99,777	138,516	176,072	210,908
% of Forecasted Sales	2.1%	4.5%	7.1%	9.8%	12.4%	14.8%
Cumulative Annual MW						
Total	2.4	5.2	8.4	11.8	15.1	18.2
% of Forecasted Demand	0.7%	1.6%	2.5%	3.5%	4.5%	5.4%

Realistic Achievable Potential

Figure E-4 illustrates the cumulative annual RAP results by end use across the 2020-2025 timeframe. Like maximum achievable potential, Lighting, Ventilation, and Cooling are the leading end uses. Refrigeration and Office Equipment also have significant realistic achievable potential.

FIGURE E-4 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) RAP POTENTIAL BY END-USE

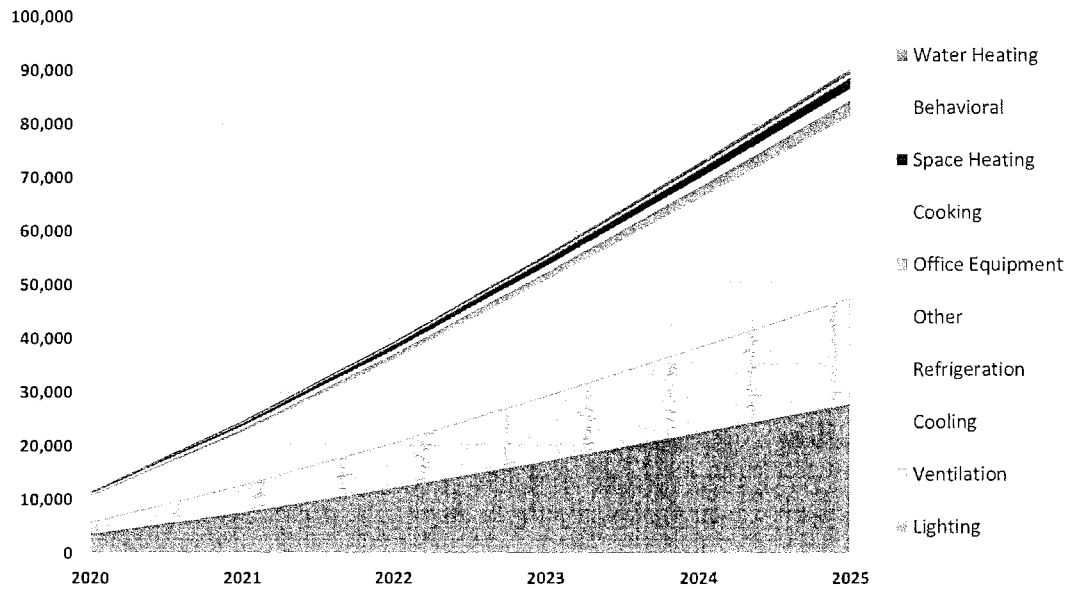


Table E-6 provides the incremental and cumulative annual RAP across the 2020-2025 timeframe. The incremental RAP ranges from 0.8% to 1.4% of forecasted sales across the six-year timeframe. Cumulative annual RAP rises to 6.3% by 2025.

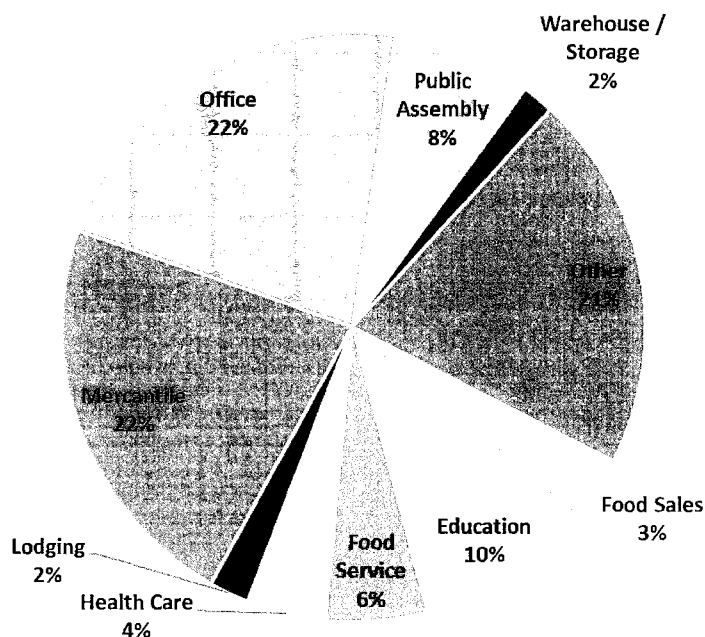
TABLE E-6 COMMERCIAL ELECTRIC RAP BY END-USE

End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Space Heating	267	302	331	346	350	344
Cooling	2,200	2,443	2,678	3,082	3,210	3,235
Ventilation	2,515	2,947	3,325	3,641	3,805	3,817
Water Heating	86	108	131	153	174	200
Lighting	3,401	4,020	4,582	5,032	5,306	5,337
Cooking	218	273	330	389	447	503
Refrigeration	1,985	2,301	2,591	2,824	3,010	3,585
Office Equipment	253	322	418	531	655	805
Behavioral	64	90	190	256	397	513
Other	588	813	1,054	1,287	1,491	1,668
Total	11,578	13,618	15,630	17,541	18,846	20,006
% of Forecasted Sales	0.8%	1.0%	1.1%	1.2%	1.3%	1.4%
Incremental Annual MW						
Total	1.0	1.2	1.4	1.5	1.6	1.6
% of Forecasted Demand	0.3%	0.4%	0.4%	0.4%	0.5%	0.5%
Cumulative Annual MWh						
Space Heating	267	570	901	1,247	1,597	1,941
Cooling	2,200	4,643	7,321	10,165	13,103	16,042
Ventilation	2,515	5,463	8,787	12,428	16,234	20,050
Water Heating	86	194	325	478	652	844

End Use	2020	2021	2022	2023	2024	2025
Lighting	3,401	7,421	12,003	17,035	22,341	27,677
Cooking	218	491	822	1,211	1,657	2,160
Refrigeration	1,985	3,873	5,932	8,097	10,316	12,533
Office Equipment	253	574	992	1,524	2,179	2,983
Behavioral	64	150	270	429	626	871
Other	588	1,306	2,158	3,127	4,180	5,290
Total	11,578	24,685	39,512	55,740	72,884	90,391
% of Forecasted Sales	0.8%	1.8%	2.8%	4.0%	5.1%	6.3%
Cumulative Annual MW						
Total	1.0	2.2	3.5	4.9	6.5	8.0
% of Forecasted Demand	0.3%	0.6%	1.0%	1.5%	1.9%	2.4%

Figure E-5 illustrates a market segmentation of the RAP in the commercial sector by 2025. Mercantile, Office, and Education are the leading building types.

FIGURE E-5 2025 COMMERCIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT



RAP Benefits & Costs

Table E-7 provides the net present value benefits and cost, as calculated using the UCT, across the 2020-2025 timeframe for the RAP scenario. Cooling and Water Heating are the most cost-effective end-uses, and Lighting also provides significant NPV benefits.

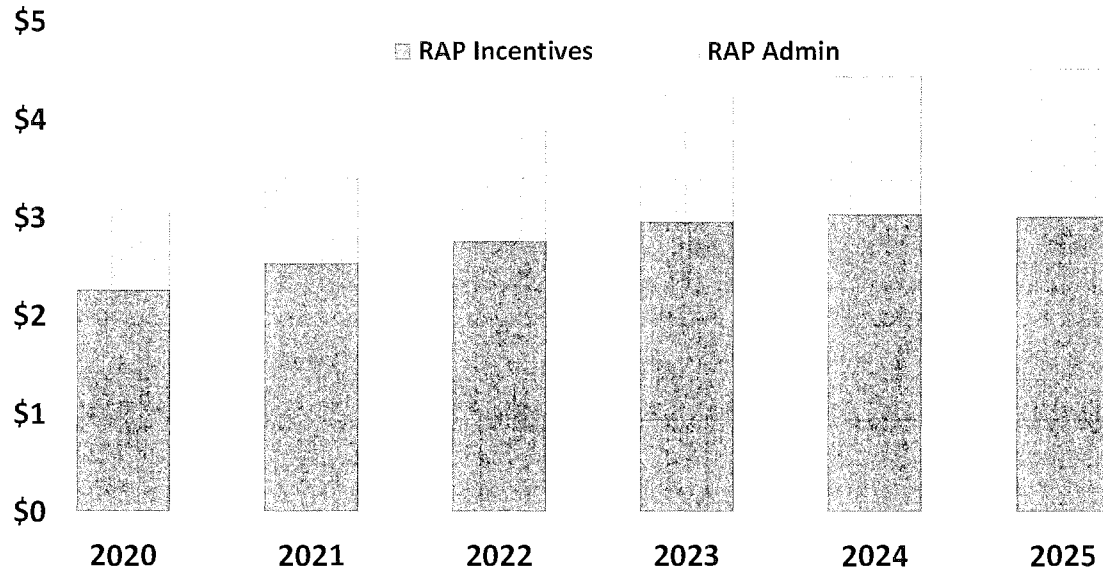
TABLE E-7 COMMERCIAL NPV BENEFITS & COSTS RAP BY END-USE (\$ IN MILLIONS)

End Use	NPV Benefits	NPV Costs	UCT Ratio
Space Heating	\$0.63	\$1.76	0.36
Cooling	\$25.49	\$7.83	3.25
Ventilation	\$7.94	\$5.05	1.57
Water Heating	\$0.21	\$0.08	2.60

End Use	NPV Benefits	NPV Cost	UCT Ratio
Lighting	\$10.75	\$5.99	1.79
Cooking	\$0.69	\$0.34	2.06
Refrigeration	\$3.45	\$2.83	1.22
Office Equipment	\$0.72	\$0.29	2.47
Behavioral	\$0.10	\$0.08	1.33
Other	\$1.95	\$0.62	3.14
Total	\$51.9	\$24.9	2.09

Figure E-6 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the 2020-2025 timeframe. The incentives rise from \$2.3 million to \$2.1 million, and overall budgets rise from \$3.1 million to \$4.5 million by 2025.

FIGURE E-6 ANNUAL BUDGETS FOR COMMERCIAL RAP (\$ IN MILLIONS)



APPENDIX F DSM Market Potential Study Industrial Opt-Out Results

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

F.1 SCOPE OF MEASURES & END USES ANALYZED

There were 165 total unique electric measures included in the analysis. Table F-1 provides number of measures by end-use (the full list of industrial measures is provided in Appendix D). The measure list was developed based on a review of current Vectren 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 F-1 INDUSTRIAL ENERGY EFFICIENCY MEASURES – BY FUEL TYPE

End-Use	Number of Unique Measures
Computers & Office Equipment	6
Water Heating	6
Ventilation	7
Space Cooling	22
Space Heating	16
Cooking	7
Refrigeration	25
Lighting	20
Other	7
Machine Drive	21
Process Heating and Cooling	12
Agriculture	16

F.2 INDUSTRIAL ELECTRIC POTENTIAL

Figure F-1 provides the technical, economic, MAP and RAP results for the 6-year, 10-year, and 20-year timeframes. The 6-year technical potential is 18.9% of forecasted sales, and the economic potential is 18.0% of forecasted sales. The 6-year MAP is 13.2% and the RAP is 6.4%.

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FIGURE F-1 INDUSTRIAL ELECTRIC ENERGY CUMULATIVE ANNUAL POTENTIAL (AS A % OF INDUSTRIAL SALES)

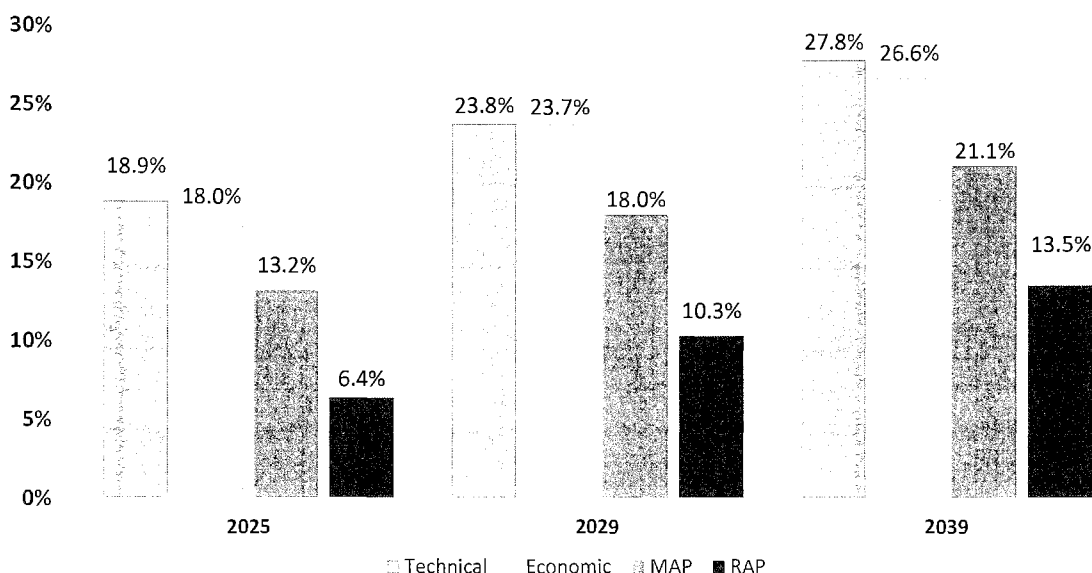


Table F-2 provides cumulative annual technical, economic, MAP and RAP energy savings, in total MWh and as a percentage of the sector-level sales forecast. The RAP reaches 6.4% after six years.

TABLE F-2 INDUSTRIAL CUMULATIVE ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	66,750	142,458	224,968	309,520	383,043	447,367
Economic	63,335	135,371	214,263	295,502	366,107	427,911
MAP	41,085	90,213	146,167	205,384	261,922	312,473
RAP	19,324	41,785	67,208	94,837	123,025	151,326
Forecasted Sales	2,329,890	2,336,776	2,345,264	2,354,201	2,362,591	2,371,200
Energy Savings (as % of Forecast)						
Technical	2.9%	6.1%	9.6%	13.1%	16.2%	18.9%
Economic	2.7%	5.8%	9.1%	12.6%	15.5%	18.0%
MAP	1.8%	3.9%	6.2%	8.7%	11.1%	13.2%
RAP	0.8%	1.8%	2.9%	4.0%	5.2%	6.4%

Table F-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 0.8% to 1.6% per year over the next six years.

TABLE F-3 INDUSTRIAL INCREMENTAL ANNUAL ENERGY EFFICIENCY POTENTIAL SUMMARY

	2020	2021	2022	2023	2024	2025
MWh						
Technical	66,750	78,664	89,185	95,702	97,760	95,516
Economic	63,335	74,992	85,566	92,390	94,842	92,995
MAP	41,085	51,432	61,105	67,856	71,118	70,784
RAP	19,324	23,576	27,883	31,695	35,218	38,149
Forecasted Sales	2,329,890	2,336,776	2,345,264	2,354,201	2,362,591	2,371,200
Energy Savings (as % of Forecast)						
Technical	2.9%	3.4%	3.8%	4.1%	4.1%	4.0%

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	2020	2021	2022	2023	2024	2025
MWh						
Economic	2.7%	3.2%	3.6%	3.9%	4.0%	3.9%
MAP	1.8%	2.2%	2.6%	2.9%	3.0%	3.0%
RAP	0.8%	1.0%	1.2%	1.3%	1.5%	1.6%

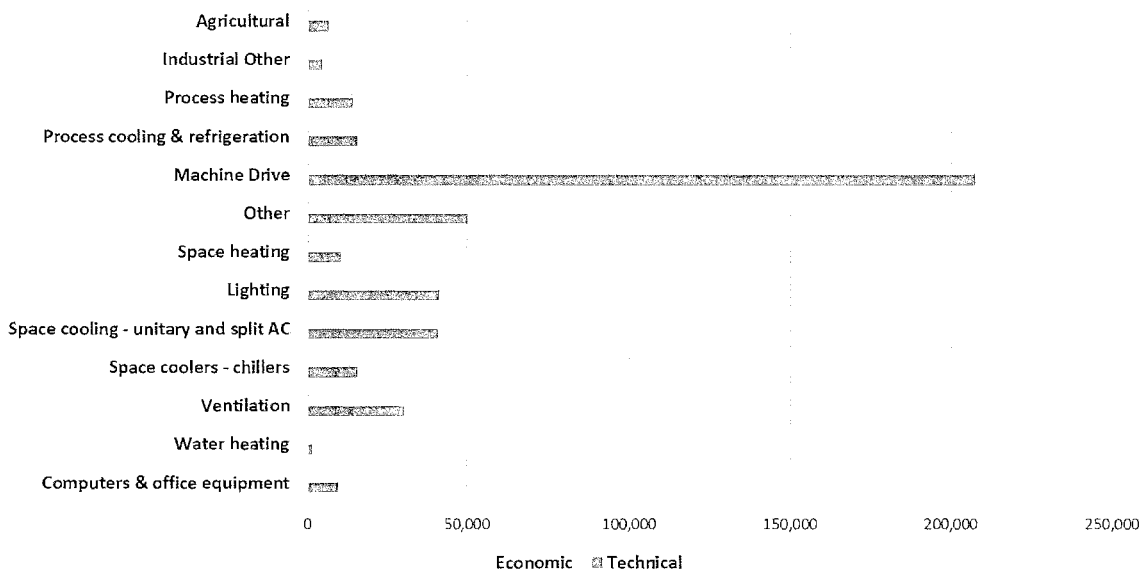
Technical & Economic Potential

Table F-4 provides cumulative annual technical and economic potential results from 2020-2025. Figure F-2 shows a comparison of the technical and economic potential (6-year) by end use. Machine drive, Lighting, and Space Cooling – unitary and split AC are the leading stand-alone end uses among technical and economic potential.

TABLE F-4 TECHNICAL AND ECONOMIC INDUSTRIAL ELECTRIC POTENTIAL

	2020	2021	2022	2023	2024	2025
Energy (MWh)						
Technical	66,750	142,458	224,968	309,520	383,043	447,367
Economic	63,335	135,371	214,263	295,502	366,107	427,911
Peak Demand (MW)						
Technical	12	25	40	54	67	78
Economic	11	24	38	52	64	74

FIGURE F-2 YEAR TECHNICAL AND ECONOMIC INDUSTRIAL ELECTRIC POTENTIAL – BY END-USE



Maximum Achievable Potential

Figure F-3 illustrates the cumulative annual MAP results by end use across the 2020-2025 timeframe. Like technical and economic potential, Machine Drive, Lighting, and Space Cooling – unitary and split AC are the leading end uses. Ventilation and Space coolers – chillers also have significant maximum achievable potential.

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FIGURE F-3 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) MAP POTENTIAL BY END-USE

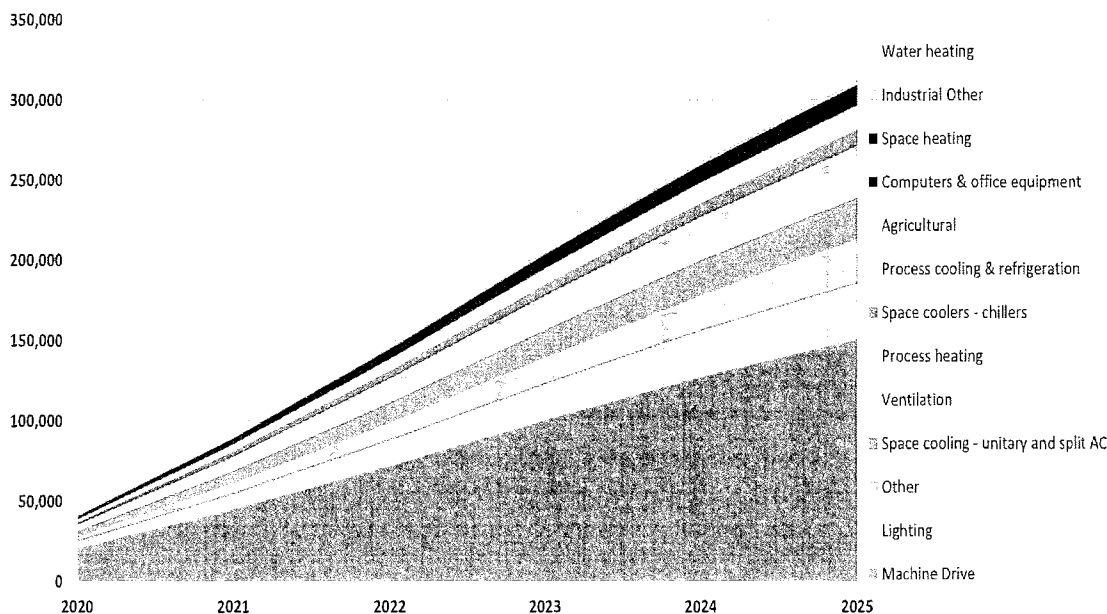


Table F-5 provides the incremental and cumulative annual MAP across the 2020-2025 timeframe. The incremental MAP ranges from 1.8% to 3.0% of forecasted sales across the six-year timeframe. Cumulative annual MAP rises to 13.1% by 2025.

TABLE F-5 INDUSTRIAL ELECTRIC MAP BY END-USE

End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Computers & office equipment	747	960	1,161	1,323	1,438	1,690
Water heating	89	92	98	109	123	134
Ventilation	2,728	3,394	3,978	4,236	4,083	3,582
Space coolers - chillers	1,410	1,685	1,908	1,991	2,042	1,872
Space cooling - unitary and split AC	3,688	4,383	4,974	5,221	5,393	4,904
Lighting	4,373	5,445	6,488	7,215	7,379	6,985
Space heating	921	1,103	1,260	1,327	1,381	1,264
Other	2,729	3,547	4,438	5,333	6,285	7,279
Machine Drive	20,695	25,930	30,767	34,161	35,486	35,311
Process cooling & refrigeration	1,307	1,812	2,312	2,747	3,082	3,314
Process heating	1,324	1,836	2,373	2,818	3,105	3,227
Industrial Other	392	433	460	483	509	537
Agricultural	683	810	890	891	812	684
Total	41,085	51,432	61,105	67,856	71,118	70,784
% of Forecasted Sales	1.8%	2.2%	2.6%	2.9%	3.0%	3.0%
Incremental Annual MW						
Total	7	9	11	12	12	12
% of Forecasted Demand	1.8%	2.2%	2.6%	2.9%	3.0%	3.0%

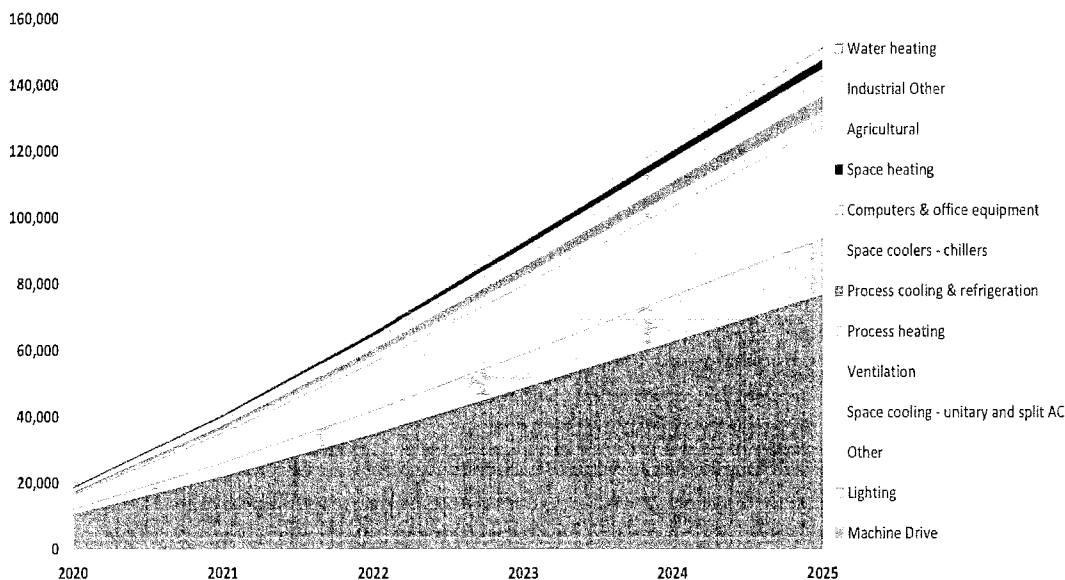
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End Use	2020	2021	2022	2023	2024	2025
Cumulative Annual MWh						
Computers & office equipment	747	1,707	2,868	4,191	5,122	5,950
Water heating	89	181	279	389	512	643
Ventilation	2,728	6,101	10,030	14,185	18,147	21,568
Space coolers - chillers	1,410	3,088	4,981	6,947	8,828	10,343
Space cooling - unitary and split AC	3,688	8,010	12,845	17,811	22,452	26,423
Lighting	4,373	9,662	15,802	22,429	28,941	34,762
Space heating	921	2,010	3,237	4,509	5,711	6,752
Other	2,729	6,276	10,711	16,038	21,434	27,268
Machine Drive	20,695	45,027	72,224	100,437	127,306	150,868
Process cooling & refrigeration	1,307	2,901	4,725	6,648	8,513	10,194
Process heating	1,324	2,960	4,887	6,952	8,944	10,679
Industrial Other	392	798	1,196	1,574	1,928	2,258
Agricultural	683	1,493	2,382	3,273	4,084	4,765
Total	41,085	90,213	146,167	205,384	261,922	312,473
% of Forecasted Sales	1.8%	3.9%	6.2%	8.7%	11.1%	13.2%
Cumulative Annual MW						
Total	7	16	26	36	46	54
% of Forecasted Demand	1.8%	3.9%	6.3%	8.8%	11.1%	13.1%

Realistic Achievable Potential

Figure F-4 illustrates the cumulative annual RAP results by end use across the 2020-2025 timeframe. Like maximum achievable potential, Machine Drive, Lighting, and Space Cooling – unitary and split AC are the leading end uses. Ventilation and Space coolers – chillers also have significant maximum achievable potential.

FIGURE F-4 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL GWH) RAP POTENTIAL BY END-USE



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Table F-6 provides the incremental and cumulative annual RAP across the 2020-2025 timeframe. The incremental RAP ranges from 0.8% to 1.6% of forecasted sales across the six-year timeframe. Cumulative annual RAP rises to 6.4% by 2025.

TABLE F-6 INDUSTRIAL ELECTRIC RAP BY END-USE

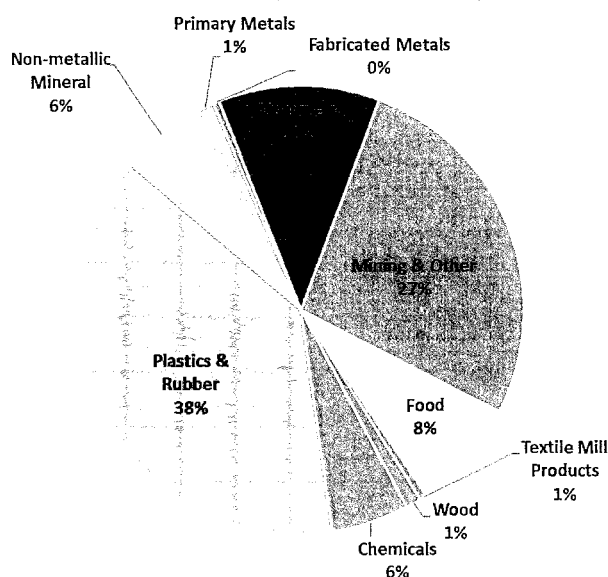
End Use	2020	2021	2022	2023	2024	2025
Incremental Annual MWh						
Computers & office equipment	512	616	716	810	894	1,062
Water heating	20	27	35	45	55	64
Ventilation	1,246	1,488	1,713	1,858	1,935	1,938
Space coolers - chillers	564	675	777	850	952	980
Space cooling - unitary and split AC	1,385	1,664	1,924	2,100	2,379	2,440
Lighting	2,156	2,621	3,073	3,450	3,738	3,895
Space heating	352	424	492	540	613	630
Other	1,204	1,547	1,939	2,351	2,780	3,281
Machine Drive	10,213	12,370	14,581	16,581	18,298	19,856
Process cooling & refrigeration	625	823	1,031	1,250	1,473	1,689
Process heating	589	796	1,019	1,235	1,446	1,643
Industrial Other	97	121	149	179	212	247
Agricultural	362	404	431	446	444	424
Total	19,324	23,576	27,883	31,695	35,218	38,149
% of Forecasted Sales	0.8%	1.0%	1.2%	1.3%	1.5%	1.6%
Incremental Annual MW						
Total	3	4	5	6	6	7
% of Forecasted Demand	0.9%	1.0%	1.2%	1.4%	1.5%	1.6%
Cumulative Annual MWh						
Computers & office equipment	512	1,127	1,843	2,654	3,164	3,652
Water heating	20	47	83	128	182	245
Ventilation	1,246	2,725	4,418	6,243	8,128	9,996
Space coolers - chillers	564	1,236	2,007	2,847	3,729	4,536
Space cooling - unitary and split AC	1,385	3,023	4,890	6,893	8,957	11,005
Lighting	2,156	4,711	7,639	10,846	14,223	17,623
Space heating	352	769	1,248	1,765	2,302	2,837
Other	1,204	2,751	4,690	7,039	9,365	11,987
Machine Drive	10,213	21,783	34,604	48,291	62,398	76,424
Process cooling & refrigeration	625	1,348	2,156	3,032	3,950	4,876
Process heating	589	1,293	2,108	3,001	3,940	4,886
Industrial Other	97	205	326	458	600	750
Agricultural	362	766	1,197	1,642	2,086	2,509
Total	19,324	41,785	67,208	94,837	123,025	151,326
% of Forecasted Sales	0.8%	1.8%	2.9%	4.0%	5.2%	6.4%
Cumulative Annual MW						

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End Use	2020	2021	2022	2023	2024	2025
Total	3	7	12	17	21	26
% of Forecasted Demand	0.9%	1.8%	2.9%	4.1%	5.2%	6.4%

Figure F-5 illustrates a market segmentation of the RAP in the industrial sector by 2025. Plastics & rubber, Mining & Other, and Machinery are the leading market segments.

FIGURE F-5 2025 INDUSTRIAL ELECTRIC ENERGY (CUMULATIVE ANNUAL) RAP POTENTIAL BY MARKET SEGMENT¹



RAP Benefits & Costs

Table F-6^{Error! Reference source not found.} provides the net present value benefits and cost, as calculated using the UCT, across the 2020-2025 timeframe for the RAP scenario. Machine Drive is the most cost-effective end-use. Facility HVAC and Facility Lighting also provide significant NPV benefits.

TABLE F-7 INDUSTRIAL NPV BENEFITS AND COSTS RAP BY END-USE (\$ IN MILLIONS)

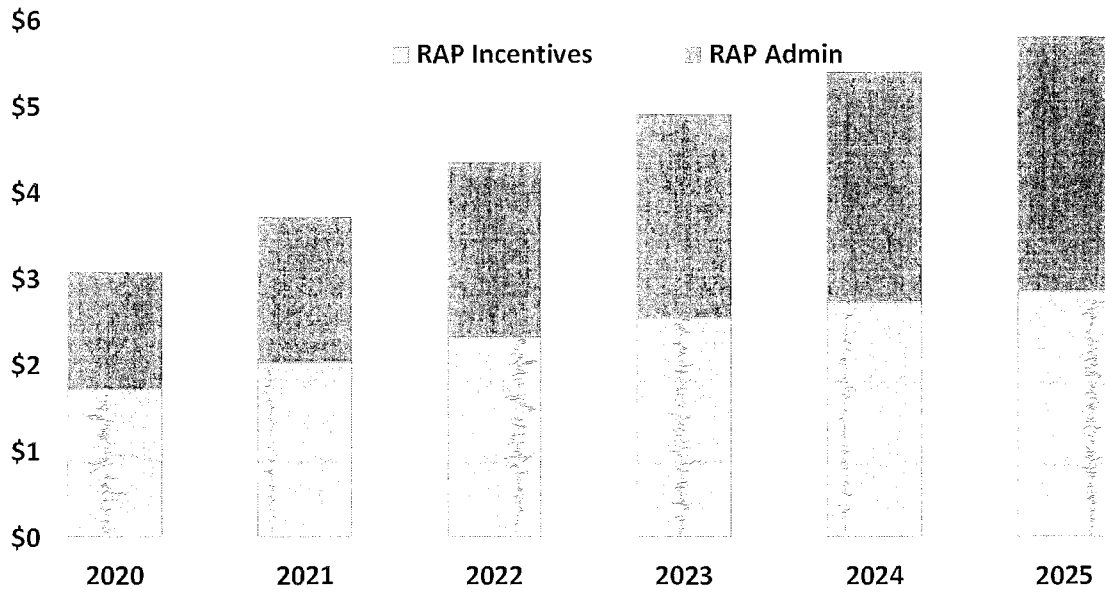
End Use	NPV Benefits	NPV Costs	UCT Ratio
Machine Drive	\$49.7	\$8.4	5.90
Facility HVAC	\$14.4	\$3.6	2.81
Facility Lighting	\$11.1	\$6.0	2.64
Other Facility Support	\$5.4	\$2.2	1.53
Process Cooling and Refrigeration	\$2.7	\$0.7	3.64
Process Heating	\$2.0	\$0.5	4.59
Other	\$6.8	\$2.2	3.04
Total	92.1	23.5	3.91

Figure F-6 provides the budget for the RAP scenario. The budget is broken into incentive and admin budgets for each year of the 2020-2025 timeframe. The incentives rise from \$1.7 million to \$2.9 million, and overall budgets rise from \$3.1 million to \$5.8 million by 2025.

¹ "Wholesale/Retail" and "Services" industrial types include industrial buildings that devote a minority percentage of floor space to commercial activities like wholesale and retail trade, and construction, healthcare, education and accommodation & food service. Automotive related industries are divided between plastics, rubber, and machinery based on their NAICS codes.

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FIGURE F-6 ANNUAL BUDGETS FOR INDUSTRIAL RAP (\$ IN MILLIONS)



APPENDIX G Demand Response Methodology

G.1 DEMAND RESPONSE PROGRAM OPTIONS

Table G-1 provides a brief description of the demand response program options considered and identifies the eligible customer segment for each demand response program that was considered in this study.

TABLE G-1 DEMAND RESPONSE PROGRAM OPTIONS AND ELIGIBLE MARKETS

DR Program Option	Program Description	Eligible Markets
DLC AC (Switch)	The compressor of the air conditioner is remotely shut off (cycled) by the system operator for periods that may range from 7 ½ to 15 minutes during every 30-minute period (i.e., 25%-50% duty cycle)	Residential and Commercial Customers
DLC AC (Smart Thermostat)	The system operator can remotely raise the AC's thermostat set point during peak load conditions, lowering AC load.	Residential and Commercial Customers
DLC Pool Pumps	The swimming pool pump is remotely shut off by the system operator for periods normally ranging from 2 to 4 hours.	Residential Customers
DLC Water Heaters	The water heater is remotely shut off by the system operator for periods normally ranging from 2 to 8 hours.	Residential and Commercial Customers
Critical Peak Pricing with Enabling Technology	A retail rate in which an extra-high price for electricity is provided during a limited number of critical periods (e.g. 100 hours) of the year. Market-based prices are typically provided on a day-ahead basis, or an hour-ahead basis. Includes enabling technology that connects technologies within building. Only for customers with AC.	Residential and Commercial Customers
Critical Peak Pricing without Enabling Technology	A retail rate in which an extra-high price for electricity is provided during a limited number of critical periods (e.g. 100 hours) of the year. Market-based prices are typically provided on a day-ahead basis, or an hour-ahead basis.	Residential and Commercial Customers
Real Time Pricing	Real Time Pricing reflects the current conditions and is calculated for each hour in the billing period.	Commercial Customers

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DR Program Option	Program Description	Eligible Markets
Peak Time Rebate	Instead of charging a higher rate during critical events, participants are paid for load reductions (estimated relative to forecast of what the customer would otherwise have consumed). If customers don't want to participate, they pay the existing rate.	Residential and Commercial Customers
Time of Use Rate	A retail rate with different prices for usage during different blocks of time. Daily pricing blocks could include on-peak, mid-peak, and off-peak periods. Pricing is pre-defined, and once established do not vary with actual cost conditions.	Residential and Commercial Customers

G.2 DEMAND RESPONSE POTENTIAL ASSESSMENT APPROACH

The analysis for this study was conducted using the GDS DR Model. The GDS DR Model is an Excel spreadsheet tool that allows the user to determine the achievable potential for a demand response program based on the following two basic equations that can be chosen to be the model user.

TECHNICAL POTENTIAL ◊ All technically feasible demand reductions are incorporated to provide a measure of the theoretical maximum demand response potential. This assumes 100% of eligible customers will participate in all programs regardless of cost-effectiveness.

ECONOMIC POTENTIAL ◊ Economic potential is a subset of technical potential. Only cost-effective demand response program options are included in the economic potential. The cost-effectiveness test applied in this study is the UCT test. Only programs whose net present value of benefits exceed its costs will pass the economic screening.

ACHIEVABLE POTENTIAL ◊ The cost-effective demand response potential that can practically be attained in a real-world program delivery scenario, if a certain level of market penetration can be attained are included in this scenario. Achievable potential takes into account real-world barriers to convincing customers to participate in cost-effective demand response programs. Achievable savings potential savings is a subset of economic potential.

If the model user chooses to base the estimated potential demand reduction on a per customer CP load reduction value, then:

$$\begin{array}{l}
 \text{Achievable DR} \\
 \text{Potential}
 \end{array}
 =
 \begin{array}{l}
 \text{Potentially} \\
 \text{Eligible} \\
 \text{Customers}
 \end{array}
 \times
 \begin{array}{l}
 \text{Eligible Customer} \\
 \text{Participation} \\
 \text{Rate}
 \end{array}
 \times
 \begin{array}{l}
 \text{CP kW Load} \\
 \text{Reduction Per} \\
 \text{Participant}
 \end{array}$$

The framework for assessing the cost-effectiveness of demand response programs is based on *A Framework for Evaluating the Cost-Effectiveness of Demand Response*, prepared for the National Forum on the National Action

Plan (NAPA) on Demand Response.¹ Additionally, GDS reviewed the May 2017 National Standard Practice Manual published by the National Efficiency Screening Project.² GDS utilized this guide to define avoided ancillary services and energy and/or capacity price suppression benefits. Appendix A contains a table from the report summarizing the energy efficiency cost and benefits including in all five major benefit cost tests.

The GDS Demand Response Model determines the estimated savings for each demand response program by performing an extensive review of all benefits and cost associated with each program. GDS developed the model such that the value of future programs could be determined and to help facilitate demand response program planning strategies. The model contains approximately 50 required inputs for each program including: expected life, CP kW load reductions, proposed rebate levels, program related expenses such as vendor service fees, marketing and evaluation cost and on-going O&M expenses. This model and future program planning features can be used to standardize the cost-effectiveness screening process between Vectren departments interested in the deployment of demand response resources.

For this study, the Utility Cost Test (UCT) test was used to determine the cost-effectiveness of each demand response program. Benefits are based on avoided demand, energy (including load shifting), wholesale cost reductions and T&D costs. Costs include incremental program equipment costs (such as control switches or smart thermostats), fixed program capital costs (such as the cost of a central controller), program administrative, marketing, and evaluation costs. Incremental equipment program costs are included for both new and replacement units (such as control switches) to account for units that are replaced at the end of their useful life.

Achievable potential is broken into maximum and realistic achievable potential in this study:

MAP represents an estimate of the maximum cost-effective demand response potential that can be achieved over the 20-year study period. For this study, this is defined as customer participation in demand response program options that reflect a “best practices” estimate of what could eventually be achieved. MAP assumes no barriers to effective delivery of programs.

RAP represents an estimate of the amount of demand response potential that can be realistically achieved over the 20-year study period. For this study, this is defined as achieving customer participation in demand response program options that reflect a realistic estimate of what could eventually be achieved assuming typical or “average” industry experience. RAP is a discounted MAP, by considering program barriers that limit participation, therefore reducing savings that could be achieved.

This potential study evaluated DR potential for two achievable potential scenarios:

- 1 *Utility Incentivized Scenario:* The utility incentivized scenario assumes that all cost-effective DR programs will be implemented by Vectren and smart thermostats will be paid for and installed by the utility. Since Vectren already has a smart thermostat energy efficiency program, GDS assumed that the customers participating in this program would already have smart thermostats installed and there would be no additional cost to the utility.
- 2 *BYOT Scenario:* The bring your own thermostat (BYOT) scenario also assumes that all cost-effective DR programs will be implemented, but in this scenario smart thermostats will be used purchased and installed by the customer. GDS assumed there would be a one-time \$75 credit³.

¹ Study was prepared by Synapse Energy Economics and the Regulatory Assistance Project, February 2013.

² National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources, May 18, 2017, Prepared by The National Efficiency Screening Project

³ Vectren South 2018 Electric DSM Operating Plan

Demand savings estimates were assumed to be the same for both scenarios, but the costs are different.

G.3 AVOIDED COSTS & OTHER ECONOMIC ASSUMPTIONS

The avoided costs used to determine utility benefits were provided by Vectren. Avoided electric generation capacity refers to the demand response program benefit resulting from a reduction in the need for new peaking generation capacity. Demand response can also produce energy related benefits. If the demand response option is considered “load shifting”, such as direct load control of electric water heating, the consumption of energy is shifted from the control period to the period immediately following the period of control. For this study, GDS assumed that the energy is shifted with no loss of energy. For power suppliers, this shift in the timing of energy use can produce benefits from either the production of energy from lower cost resources or the purchase of energy at a lower rate. If the program is not considered to be “load shifting” the measure is turned off during peak control hours, and the energy is saved altogether. Demand response programs can also potentially delay the construction of new transmission and distribution lines and facilities, which is reflected in avoided T&D costs.

The discount rate used in this study is 7.29%. A peak demand line loss factor of 6.33% and a reserve margin of 8.4 % (for firm load reduction such as direct load control) were also applied to demand reductions at the customer meter. These values were provided by Vectren.

The useful life of a smart thermostat is assumed to be 15 years⁴. Load control switches have a useful life of 15 years⁵. This life was used for all direct load control measures in this study.

The number of control units per participant was assumed to be 1 for all direct load control programs using switches (such as water heaters and air conditioning switches), because load control switches can control up to two units. However, for controllable thermostats, some participants have more than one thermostat. The average number of residential thermostats per single family home was assumed to be 1.72⁶.

G.4 CUSTOMER PARTICIPATION

The assumed level of customer participation for each demand response program option is a key driver of achievable demand response potential estimates. Customer participation rates reflect the total number of eligible customers that are likely to participate in a demand response program. An eligible customer is defined as a customer that is eligible to participate in a demand response program. For DLC programs, eligibility is determined by whether a customer has the end use equipment that will be controlled⁷. The eligible customers for each program is shown in Table G-2 and Table G-3.

TABLE G-2 ELIGIBLE RESIDENTIAL CUSTOMERS IN EACH DEMAND RESPONSE PROGRAM OPTION

DRL Program Option	Saturation	Source / Description
DLC AC (Switch)	62% of residential customers	Vectren 2016 Electric Baseline Survey - % of residential homes with central AC
DLC AC (Thermostat)	62% of residential customers	Vectren 2016 Electric Baseline Survey - % of residential homes with central AC

⁴ Indiana TRM

⁵ Provided by Converge

⁶ EIA RECS table HC6.1

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DR Program Option	Saturation	Source / Description
DLC Pool Pumps	6% of residential customers	Vectren 2016 Electric Baseline Survey - % of residential homes with swimming pool pumps
DLC Water Heaters	35% of residential customers	Vectren 2016 Electric Baseline Survey - % of residential homes with electric water heaters
Critical Peak Pricing with Enabling Technology	62% of residential customers	Vectren 2016 Electric Baseline Survey - % of residential homes with central AC
Critical Peak Pricing without Enabling Technology	100% of residential customers	GDS Assumption
Peak Time Rebate	100% of residential customers	GDS Assumption
Time of Use	100% of residential customers	GDS Assumption

TABLE G-3 ELIGIBLE NON-RESIDENTIAL CUSTOMERS IN EACH DEMAND RESPONSE PROGRAM OPTION

DR Program Option	Saturation	Source / Description
DLC AC (Switch)	81.5% of commercial customers	GDS Survey of Vectren C&I Customers - % of C&I customers with central AC
DLC AC (Thermostat)	81.5% of commercial customers	GDS Survey of Vectren C&I Customers - % of C&I customers with central AC
DLC Water Heaters	40% of commercial customers	CBECs 2015 - % of commercial customers in East North Central region with electric water heaters
Critical Peak Pricing with Enabling Technology	81.5% of commercial customers	GDS Survey of Vectren C&I Customers - % of C&I customers with central AC
Critical Peak Pricing without Enabling Technology	100% of commercial customers	GDS Assumption
Real Time Pricing	100% of commercial customers	GDS Assumption
Peak Time Rebate	100% of commercial customers	GDS Assumption
Time of Use	100% of commercial customers	GDS Assumption

G.4.1 Existing Demand Response Programs

Vectren and its owner-member cooperatives have offered their Direct Load Control program for many years. This program offers incentives to members who enroll central AC and electric water heaters. However, Vectren plans to transition the DLC AC switch program to be controlled with smart thermostats instead. The DLC water heating and pool pump programs are being phased out. GDS assumed that all DLC programs controlled with switches would be ended by 2023. A cost-effective analysis was still run for these programs, with the assumption that no new switches would be installed and participation would steadily decline until 2023.

G.4.2 Hierarchy

Double-counting savings from demand response programs that affect the same end uses is a common issue that must be addressed when calculating the demand response savings potential. For example, a direct load control program of air conditioning and a rate program both assume load reduction of the customers' air conditioners. For this reason, it is typically assumed that customers cannot participate in programs that affect the same end uses. This hierarchy where direct load control programs come before rate programs was chosen by Vectren. The order of the rest of the programs is based on savings. Programs with higher savings per customer are ranked as higher in the hierarchy.

TABLE G-4 DEMAND RESPONSE HIERARCHY

DLC Program Option	Applicable Sector
DLC Programs	Residential, Commercial
Critical Peak Pricing with Enabling Technology	Residential, Commercial
Critical Peak Pricing without Enabling Technology	Residential, Commercial
Real Time Pricing	Commercial
Peak Time Rebates	Residential, Commercial
Time of Use	Residential, Commercial

G.4.3 Participation Rates

The assumed "steady state" participation rates used in this potential study and the sources upon which each assumption is based are shown in Table G-5 for residential and non-residential customers, respectively. The steady state participation rate represents the enrollment rate once the fully achievable participation has been reached. Participation rates are expressed as a percentage of eligible customers. Program participation and impacts (demand reductions) are assumed to begin in 2020. The main sources of participant rates are several studies completed by the Brattle Group. Additional detail about participation rates and sources are shown in Table G-5.

TABLE G-5 STEADY STATE PARTICIPATION RATES FOR DEMAND RESPONSE PROGRAM OPTIONS

DLC Program Option	RAP Steady State Participation Rate	RAP Steady State Participation Rate	Source
RESIDENTIAL			
DLC AC (Switch)	0% (existing program declining to 0 participants)	0% (existing program declining to 0 participants)	Vectren
DLC AC (Thermostat)	36%	25%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Participation in BYOD programs is estimated to be 5% higher than in DLC programs.)
DLC Pool Pumps	0% (existing program declining to 0 participants)	0% (existing program declining to 0 participants)	Vectren
DLC Water Heaters	0% (existing program declining to 0 participants)	0% (existing program declining to 0 participants)	Vectren

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DR Program Options	MAP Steady State Participation Rate	RAP Steady State Participation Rate	Source
Critical Peak Pricing with Enabling Technology	91%	22%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
Critical Peak Pricing without Enabling Technology	82%	17%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
Peak Time Rebate	93%	21%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
Time of Use	85%	28%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
NON-RESIDENTIAL			
DLC AC (Switch)	0% (existing program declining to 0 participants)	0% (existing program declining to 0 participants)	Vectren
DLC AC (Thermostat)	19%	8%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Participation in BYOD programs is estimated to be 5% higher than in DLC programs.)
DLC Water Heaters	0% (existing program declining to 0 participants)	0% (existing program declining to 0 participants)	Vectren
Critical Peak Pricing with Enabling Technology	69%	20%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
Critical Peak Pricing without Enabling Technology	63%	18%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
Real Time Pricing	3%	3%	PACIFICORP DEMAND-SIDE RESOURCE POTENTIAL ASSESSMENT FOR 2015-2034

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DR Program Options	MAP Steady State Participation Rate	RAP Steady State Participation Rate	Source
Peak Time Rebate	71%	22%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)
Time of Use	74%	13%	Demand Response Market Research: Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (Opt-Out for MAP, Opt-In for RAP)

Customer participation in new demand response programs is assumed to reach the steady state take rate over a five-year period. The path to steady state customer participation follows an “S-shaped” curve, in which participation growth accelerates over the first half of the five-year period, and then slows over the second half of the period (see Figure G-1). Existing programs have already gone through this ramp-up period, so they were escalated linearly to the final participation rate.

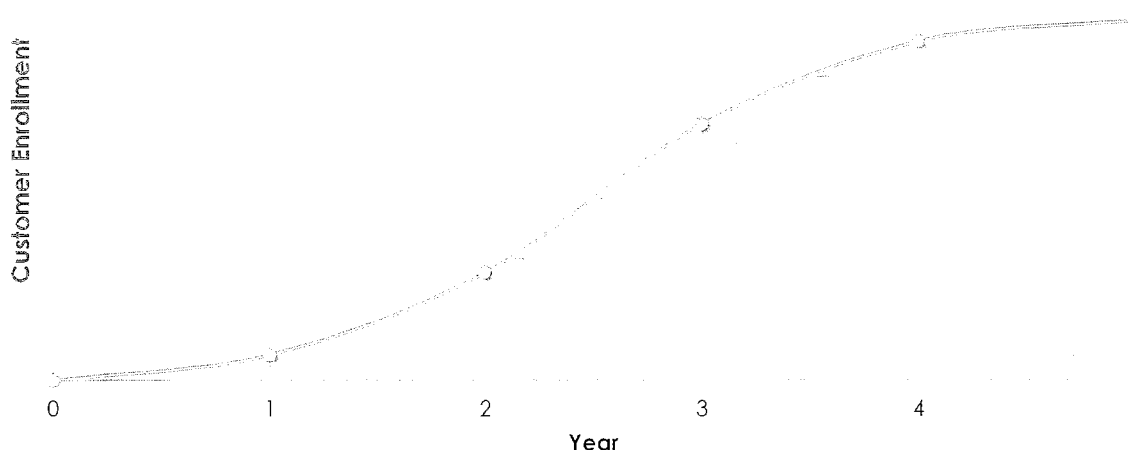


FIGURE G-1 ILLUSTRATION OF S-SHAPED MARKET ADOPTION CURVE

G.5 LOAD REDUCTION ASSUMPTIONS

Table G-6 presents the residential and non-residential per participant CP demand reduction impact assumptions for each demand response program option at the customer meter. Demand reductions were based on load reductions found in Vectren’s existing demand response programs, and various secondary data sources including the FERC and other industry reports, including demand response potential studies.

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TABLE G-6 PER PARTICIPANT CP DEMAND REDUCTION ASSUMPTIONS

DR Program Options	Per Participant CP Demand Reduction	Source
RESIDENTIAL		
DLC AC (Switch)	1 kW	2012 FERC Demand Response Survey Data (Reported realized savings data for 20 utility programs, adjusted to account for peak summer temperature differences using NOAA Normal Max Summer Temperature Data, 1981-2010)
DLC AC (Thermostat)	0.87 kW	87% of Load Switch Control. Sources: Smart Thermostats: An Alternative to Load Control Switches? Trends and Strategic Options to Consider for Residential Load Control Programs; 2016 Demand Response Potential Study Conducted by GDS for several Michigan utilities (Confidential pilot program report)
DLC Pool Pumps	1.36 kW	Southern California Edison Pool Pump Demand Response Potential Report, 2008.
DLC Water Heaters	0.4 kW Summer	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
Critical Peak Pricing with Enabling Technology	31% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
Critical Peak Pricing without Enabling Technology	11.7% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
Peak Time Rebate	12.9% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
Time of Use	5.2% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
NON-RESIDENTIAL		
DLC AC (Switch)	1.6 kW	2012 FERC Demand Response Survey Data (Reported realized savings data for 14 utility programs, adjusted to account for peak summer temperature differences using NOAA Normal Max Summer Temperature Data, 1981-2010)

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DR Program Options	Per Participant CP Demand Reduction	Source
DLC AC (Thermostat)	1.39 kW	87% of Load Switch Control. Sources: Smart Thermostats: An Alternative to Load Control Switches? Trends and Strategic Options to Consider for Residential Load Control Programs; 2016 Demand Response Potential Study Conducted by GDS for several Michigan utilities (Confidential pilot program report)
DLC Water Heaters	1.2 kW Summer	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
Critical Peak Pricing with Enabling Technology	21.5% of coincident peak load	Dynamic Pricing: Transitioning from Experiments to Full Scale Deployments, Michigan Retreat on Peak Shaving to Reduce Wasted Energy, The Brattle Group, August 06, 2014.
Critical Peak Pricing without Enabling Technology	4.2% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (avg of small, med, lrg C&I)
Real Time Pricing	8.4% of coincident peak load	Pacificorp Demand-Side Resource Potential Assessment for 2015-2034
Peak Time Rebate	0.7% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016.
Time of Use	1.97% of coincident peak load	Demand Response Market Research:Portland General Electric, 2016 to 2035, The Brattle Group, January 2016. (avg of small, med, lrg C&I)

G.6 PROGRAM COSTS

One-time program development costs of \$40,000⁸ were included in the first year of the analysis for new programs. No program development costs are assumed for programs that already exist. It was assumed that there would be a cost of \$50⁹ per new participant for marketing. Marketing costs are assumed to be 33.3% higher for MAP. There was assumed to be an annual administrative cost of \$30,000 per program¹⁰. All program costs were escalated each year by the general rate of inflation assumed for this study.¹¹ Table G-7 shows the equipment cost assumptions.

⁸ TVA Potential Study Volume III: Demand Response Potential, Global Energy Partners, December 2011; \$400,000 split between 10 rate programs

⁹ TVA Potential Study Volume III: Demand Response Potential, Global Energy Partners, December 2011

¹⁰ Calculated based on the contract labor and Vectren South Expenses in the 2016 DLC Annual Report. GDS divided this cost by the 6 existing programs and assumed a \$30,000 cost per program.

¹¹ The general rate of inflation used for this study was 1.6%. This was provided by Vectren.

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TABLE G-7 EQUIPMENT COST ASSUMPTIONS

Device	Cost	Applicable DR Programs	Source
Two-way communicating load control switch using Wi-Fi	\$95	DLC programs controlled by switches	Comverge
Load control switch installation	\$200	All DLC programs controlled by switches	Comverge
Smart controllable thermostat (such as Nest or Ecobee)	\$249	DLC AC Thermostat	Nest / Ecobee

APPENDIX H *Action Plan Combined Gas & Electric Portfolio Summary*

The following tables provide combined electric and gas portfolio targets for all programs for the years 2020-2025, with individual tables for each year.

TABLE H-1 2020 COMBINED PORTFOLIO TARGETS

Program	Number of Participants	Total Budget Savings	Peak Demand (kW)	ELECTRIC				GAS						
				Admin	Implementation	Incentives	Total Budget	Number of Participants	Total Budget Savings	Admin	Implementation	Incentives	Total Budget	
Residential														
Residential Lighting	239,866	8,088,914	905.24	\$101,000	\$186,419	\$463,014	\$750,433							
Residential Prescriptive	7,966	2,465,148	691.22	\$40,400	\$347,608	\$632,065	\$1,020,073	15,750	1,438,213	\$29,600	\$1,090,398	\$2,456,695	\$3,576,693	
Residential New Construction	86	188,624	121.46	\$5,050	\$50,000	\$16,775	\$71,825	704	305,150	\$3,700	\$286,083	\$379,375	\$669,158	
Home Energy Assessment	300	519,393	55.48	\$5,050	\$240,000	-	\$245,050	300	20,924	\$3,700	\$55,000	-	\$58,700	
Income-Qualified Weatherization	539	778,285	443.32	\$20,200	\$1,275,176	-	\$1,295,376	513	56,971	\$14,800	\$872,202	-	\$887,002	
Energy-Efficient Schools	2,600	1,149,200	136.50	\$20,200	\$113,589	-	\$133,789	2,600	38,480	\$22,200	\$28,397	-	\$50,597	
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$40,400	\$323,803	-	\$364,203	34,778	375,933	\$37,000	\$108,182	-	\$145,182	
Appliance Recycling	1,251	1,179,811	171.20	\$40,400	\$143,657	\$61,000	\$245,057							
CVR Residential	-	1,461,047	430	\$30,300	\$218,023	-	\$248,323							
Smart Cycle (DLC Change Out)	1,000	-	1,015.00	\$20,200	\$516,000	\$96,000	\$632,200							
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$20,200	\$22,280	\$52,280	\$94,760							
Food Bank	-	-	-	-	-	-	-	-	-	-	-	-	-	
Home Energy Management Systems	-	-	-	\$10,100	\$70,000	-	\$80,100	-	-	\$11,100	\$130,000	-	\$141,100	
Multi-Family Direct Install								1,700	68,591	\$14,800	\$397,115	-	\$411,915	
Targeted Income								46	15,022	\$29,600	\$74,470	-	\$104,070	
Home Energy House Call-Integrated								1,122	49,144	\$29,600	\$179,527	-	\$209,127	
Neighborhood Program-Integrated								1,000	134,440	\$29,600	\$185,910	-	\$215,510	
Residential Subtotal	302,908	22,879,629	5,783.70	\$353,500	\$3,506,555	\$1,321,134	\$5,181,189	58,513	2,502,868	\$225,700	\$3,407,285	\$2,836,070	\$6,469,055	
Commercial & Industrial														
Commercial Prescriptive	42,431	14,490,335	3,807.71	\$55,550	\$622,327	\$1,370,010	\$2,047,886	1,112	298,228	\$66,600	\$442,240	\$251,057	\$759,897	
Commercial Custom	196	6,107,234	740.00	\$60,600	\$344,162	\$491,537	\$896,299	71	472,810	\$74,000	\$493,803	\$489,600	\$1,057,403	
Small Business	381	2,940,932	213.00	\$5,050	\$215,618	\$548,167	\$768,835	592	16,788	\$3,700	\$3,096	\$5,886	\$12,682	

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	ELECTRIC							GAS					
	Number of Participants	Total kWh Savings	Total Peak Demand	Admin.	Implementation	Incentives	Total Budget	Number of Participants	Total kWh Savings	Admin.	Implementation	Incentives	Total Budget
CVR Commercial	-	1,032,656	214	\$30,300	\$148,233	-	\$178,533						
Commercial & Industrial Subtotal	43,008	24,571,158	4,974.71	\$151,500	\$1,330,340	\$2,409,714	\$3,891,554	1,775	787,826	\$144,300	\$939,139	\$746,543	\$1,829,982
Indirect Costs				ELECTRIC				GAS					
Contact Center							\$63,000						\$132,080
Online Audit							\$42,911						\$200,564
Outreach							\$410,000						\$534,863
Portfolio Costs Subtotal							\$515,911						\$867,508
Subtotal (Before Evaluation)							\$9,588,653						\$9,166,544
Evaluation							\$490,728						\$482,414
DSM Portfolio Total							\$10,079,381						\$9,648,958
Other Costs				ELECTRIC				GAS					
Emerging Markets							\$200,000						\$200,000
Market Potential Study							-						-
Other Costs Subtotal							\$200,000						\$200,000
DSM Portfolio Total including Other Costs							\$10,279,381						\$9,848,958

TABLE H -2 2021 COMBINED PORTFOLIO TARGETS

	ELECTRIC							GAS					
	Number of Participants	Total kWh Savings	Total Peak Demand	Admin.	Implementation	Incentives	Total Budget	Number of Participants	Total kWh Savings	Admin.	Implementation	Incentives	Total Budget
Residential				ELECTRIC				GAS					
Residential Lighting	262,832	8,704,288	875.28	\$102,616	\$189,402	\$455,001	\$747,018						
Residential Prescriptive	8,276	2,618,629	661.70	\$41,046	\$353,169	\$645,510	\$1,039,726	16,021	1,456,999	\$30,074	\$1,107,845	\$2,491,995	\$3,629,913
Residential New Construction	77	168,932	108.81	\$5,131	\$57,249	\$15,025	\$77,405	857	369,380	\$3,759	\$342,221	\$452,875	\$798,855
Home Energy Assessment	350	605,959	64.72	\$5,131	\$258,000	-	\$263,131	350	24,412	\$3,759	\$55,880	-	\$59,639
Income-Qualified Weatherization	566	823,215	467.28	\$20,523	\$1,293,527	-	\$1,314,050	538	60,190	\$15,037	\$885,268	-	\$900,304

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Program	Electric							Gas						
	Number of Participants	Program Savings	Program Cost (\$/participant)	Admin. Cost	Program Investment	Program Payback	Program Budget	Number of Participants	Program Savings	Admin. Cost	Program Investment	Program Payback	Program Budget	
Energy-Efficient Schools	2,600	1,149,200	136.50	\$20,523	\$117,253	-	\$137,776	2,600	38,480	\$22,555	\$29,313	-	\$51,868	
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$20,523	\$328,984	-	\$349,507	34,778	375,933	\$22,555	\$109,913	-	\$132,468	
Appliance Recycling	1,344	1,285,473	172.83	\$41,046	\$159,415	\$66,625	\$267,086							
CVR Residential	-	-	-	\$30,785	\$197,378	-	\$228,163							
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$20,523	\$536,000	\$116,000	\$672,523							
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$20,523	\$30,280	\$60,280	\$111,083							
Food Bank	6,312	1,564,332	172.21	\$20,523	\$92,517	-	\$113,041	6,312	41,628	\$15,037	\$4,626	-	\$19,663	
Home Energy Management Systems	1,000	515,000	80.00	\$10,262	\$212,900	-	\$223,162	1,000	54,400	\$11,278	\$194,100	-	\$205,378	
Multi-Family Direct Install								1,700	68,591	\$15,037	\$403,469	-	\$418,506	
Targeted Income								46	15,022	\$30,074	\$75,662	-	\$105,735	
Home Energy House Call-Integrated								1,122	49,144	\$30,074	\$182,399	-	\$212,473	
Neighborhood Program-Integrated								1,000	134,440	\$30,074	\$188,885	-	\$218,959	
Residential Subtotal	333,657	24,682,235	5,568.60	\$359,156	\$3,826,074	\$1,358,441	\$5,543,671	66,324	2,688,619	\$229,311	\$3,579,580	\$2,944,870	\$6,753,761	
Commercial & Industrial				ELECTRIC				GAS						
Commercial Prescriptive	48,449	15,981,655	4,131.23	\$56,439	\$682,432	\$1,424,756	\$2,163,627	1,193	315,496	\$67,666	\$487,528	\$266,357	\$821,550	
Commercial Custom	196	6,107,234	740.00	\$61,570	\$349,669	\$491,537	\$902,775	71	472,810	\$75,184	\$501,704	\$489,600	\$1,066,488	
Small Business	382	2,944,615	213.00	\$5,131	\$219,172	\$539,573	\$763,876	1,025	18,516	\$3,759	\$3,209	\$6,006	\$12,975	
CVR Commercial	-	-	-	\$30,785	\$133,547	-	\$164,332							
Commercial & Industrial Subtotal	49,027	25,033,504	5,084.23	\$153,924	\$1,384,820	\$2,455,867	\$3,994,610	2,289	806,822	\$146,609	\$992,441	\$761,963	\$1,901,012	
Indirect Costs				ELECTRIC				GAS						
Contact Center							\$64,008						\$134,193	
Online Audit							\$43,598						\$203,774	
Outreach							\$416,560						\$543,421	

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	Emerging Markets	Market Potential Study	Other Costs	Total	DSM Portfolio Total	Other Costs	Total	
Portfolio Costs Subtotal				\$524,166			\$881,388	
Subtotal (Before Evaluation)				\$10,062,446			\$9,536,161	
Evaluation				\$522,653			\$507,425	
DSM Portfolio Total				\$10,585,099			\$10,043,586	
Other Costs	ELECTRIC				GAS			
Emerging Markets				200,000			200,000	
Market Potential Study				300,000			300,000	
Other Costs Subtotal				500,000			500,000	
DSM Portfolio Total including Other Costs				\$11,085,099			\$10,543,586	

TABLE H-3 2022 COMBINED PORTFOLIO TARGETS

	Emerging Markets	Market Potential Study	Other Costs	Total	DSM Portfolio Total	Other Costs	Total						
Residential	ELECTRIC				GAS								
Residential Lighting	91,708	3,259,915	255.83	\$104,258	\$144,380	\$346,846	\$595,484						
Residential Prescriptive	8,303	2,722,283	737.22	\$41,703	\$358,820	\$680,160	\$1,080,683	9,522	579,226	\$30,555	\$535,505	\$858,470	\$1,424,530
Residential New Construction	75	164,892	106.37	\$5,213	\$53,186	\$14,675	\$73,074	1,075	462,060	\$3,819	\$424,689	\$561,725	\$990,233
Home Energy Assessment	420	727,151	77.67	\$5,213	\$263,225	-	\$268,438	420	29,294	\$3,819	\$56,774	-	\$60,593
Income-Qualified Weatherization	594	869,076	492.09	\$20,852	\$1,312,171	-	\$1,333,023	564	63,502	\$15,277	\$980,165	-	\$995,443
Energy-Efficient Schools	2,600	670,800	93.60	\$20,852	\$92,229	-	\$113,080	2,600	38,480	\$22,916	\$30,743	-	\$53,659
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$20,852	\$334,248	-	\$355,099	34,778	375,933	\$22,916	\$111,671	-	\$134,587
Appliance Recycling	1,425	1,360,636	184.89	\$41,703	\$171,385	\$70,500	\$283,589						
CVR Residential	-	-	-	\$31,277	\$190,034	-	\$221,311						
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$20,852	\$556,000	\$136,000	\$712,852						

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	ELECTRIC							GAS						
	Number of Participants	Total kWh Savings	Total kW Demand	Subtotal	Implementation	Incentives	Total Budget	Number of Participants	Total Therms Savings	Total kWh Savings	Implementation	Incentives	Total Budget	
Residential														
SYOT (Bring Your Own Thermostat)	300	-	240.00	\$20,852	\$38,280	\$68,280	\$127,412							
Food Bank	6,312	816,353	69.09	\$20,852	\$18,800	-	\$39,651	6,312	41,628	\$15,278	\$4,700	-	\$19,977	
Home Energy Management Systems	1,000	515,000	80.00	\$10,426	\$219,900	-	\$230,326	1,000	54,400	\$11,458	\$187,100	-	\$198,558	
Multi-Family Direct Install								1,700	68,591	\$15,277	\$409,925	-	\$425,202	
Targeted Income								46	15,022	\$30,555	\$76,872	-	\$107,427	
Home Energy House Call-Integrated								1,122	49,144	\$30,555	\$185,318	-	\$215,872	
Neighborhood Program-Integrated								1,000	134,440	\$30,555	\$191,907	-	\$222,462	
Residential Subtotal	162,737	18,353,314	4,926.04	\$364,902	\$3,752,658	\$1,316,461	\$5,434,021	60,139	1,911,720	\$232,980	\$3,195,369	\$1,420,195	\$4,848,544	
Commercial & Industrial				ELECTRIC				GAS						
Commercial Prescriptive	52,971	17,154,963	4,383.05	\$57,342	\$733,558	\$1,448,274	\$2,239,173	1,312	338,606	\$68,748	\$541,210	\$286,137	\$896,095	
Commercial Custom	196	6,107,234	740.00	\$62,555	\$355,263	\$491,537	\$909,355	71	472,810	\$76,387	\$509,731	\$489,600	\$1,075,718	
Small Business	382	2,949,771	213.00	\$5,213	\$222,721	\$530,824	\$758,758	1,135	21,540	\$3,819	\$3,375	\$6,216	\$13,410	
CVR Commercial	-	-	-	\$31,277	\$128,261	-	\$159,538							
Commercial & Industrial Subtotal	53,549	26,211,968	5,336.05	\$156,387	\$1,439,803	\$2,470,635	\$4,066,825	2,518	832,956	\$148,955	\$1,054,315	\$781,953	\$1,985,223	
Indirect Costs				ELECTRIC				GAS						
Contact Center							\$65,032						\$136,340	
Online Audit							\$44,295						\$207,034	
Outreach							\$423,225						\$552,116	
Portfolio Costs Subtotal							\$532,552						\$895,490	
Subtotal (Before Evaluation)							\$10,033,398						\$7,729,257	
Evaluation							\$518,856						\$415,538	
DSM Portfolio Total							\$10,552,254						\$8,144,795	
Other Costs				ELECTRIC				GAS						
Emerging Markets							200,000						200,000	

	Number of Participants	Portfolio Savings	Total kW Demand	Subsidy	Implementation	Incentives	Total Budget	Number of Participants	Portfolio Savings	Subsidy	Implementation	Incentives	Total Budget
Market Potential Study							\$						\$
Other Costs Subtotal							200,000						200,000
DSM Portfolio Total including Other Costs							\$10,752,254						\$8,344,795

TABLE H -4 2023 COMBINED PORTFOLIO TARGETS

	Number of Participants	Portfolio Savings	Total kW Demand	ELECTRIC				GAS						
				Subsidy	Implementation	Incentives	Total Budget	Number of Participants	Portfolio Savings	Subsidy	Implementation	Incentives	Total Budget	
Residential														
Residential Lighting	12,231	807,282	19.16	\$105,926	\$32,756	\$78,689	\$217,370							
Residential Prescriptive	8,140	2,793,920	812.09	\$42,370	\$364,561	\$707,135	\$1,114,066	9,565	580,541	\$31,044	\$544,073	\$863,520	\$1,438,637	
Residential New Construction	73	160,852	103.94	\$5,296	\$50,202	\$14,325	\$69,824	1,253	537,581	\$3,880	\$491,921	\$650,275	\$1,146,077	
Home Energy Assessment	504	872,581	93.20	\$5,296	\$267,437	-	\$272,733	504	35,153	\$3,880	\$57,682	-	\$61,563	
Income-Qualified Weatherization	623	917,290	518.75	\$21,185	\$1,331,114	-	\$1,352,299	591	66,991	\$15,522	\$1,060,825	-	\$1,076,347	
Energy-Efficient Schools	2,600	670,800	93.60	\$21,185	\$98,274	-	\$119,460	2,600	38,480	\$23,283	\$32,758	-	\$56,041	
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$21,185	\$339,596	-	\$360,781	34,778	375,933	\$23,283	\$113,458	-	\$136,741	
Appliance Recycling	1,435	1,366,149	188.46	\$42,370	\$174,745	\$70,750	\$287,865							
CVR Residential	-	1,461,047	430	\$31,778	\$270,252	-	\$302,029							
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$21,185	\$576,000	\$156,000	\$753,185							
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$21,185	\$46,280	\$76,280	\$143,745							
Food Bank	3,156	649,158	46.71	\$21,185	\$9,550	-	\$30,735	3,156	20,814	\$15,522	\$4,775	-	\$20,297	
Home Energy Management Systems	1,000	515,000	80.00	\$10,593	\$234,900	-	\$245,493	1,000	54,400	\$11,641	\$172,100	-	\$183,741	
Multi-Family Direct Install								1,700	68,591	\$15,522	\$416,484	-	\$432,005	
Targeted Income								46	15,022	\$31,044	\$78,102	-	\$109,146	
Home Energy House Call-Integrated								1,122	49,144	\$31,044	\$188,283	-	\$219,326	

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	ELECTRIC							GAS						
	Number of Customers	Total kWh Savings	Total kW Demand	Avg. kW/Subscriber	Implementation	Investment	Total Budget	Number of Customers	Total Therms Savings	Avg. \$/therm	Implementation	Investment	Total Budget	
Neighborhood Program-Integrated								1,000	134,440	\$31,044	\$194,978	-	\$226,021	
Residential Subtotal	80,062	17,461,286	5,215.19	\$370,741	\$3,795,666	\$1,103,179	\$5,269,586	57,315	1,977,090	\$236,708	\$3,355,439	\$1,513,795	\$5,105,942	
Commercial & Industrial	ELECTRIC							GAS						
Commercial Prescriptive	55,283	17,821,076	4,524.43	\$58,259	\$769,435	\$1,434,660	\$2,262,354	1,479	365,992	\$69,848	\$598,626	\$307,777	\$976,251	
Commercial Custom	196	6,107,234	740.00	\$63,556	\$360,948	\$491,537	\$916,040	71	472,810	\$77,609	\$517,886	\$489,600	\$1,085,096	
Small Business	382	2,952,715	213.00	\$5,296	\$226,003	\$521,287	\$752,586	1,260	24,996	\$3,880	\$3,561	\$6,456	\$13,898	
CVR Commercial	-	1,032,656	214	\$31,778	\$184,861	-	\$216,639							
Commercial & Industrial Subtotal	55,861	27,913,681	5,691.43	\$158,889	\$1,541,248	\$2,447,483	\$4,147,620	2,810	863,798	\$151,338	\$1,120,073	\$803,833	\$2,075,244	
Indirect Costs	ELECTRIC							GAS						
Contact Center						\$66,073							\$138,522	
Online Audit						\$45,004							\$210,346	
Outreach						\$429,997							\$560,949	
Portfolio Costs Subtotal						\$541,073							\$909,818	
Subtotal (Before Evaluation)						\$9,958,279							\$8,091,004	
Evaluation						\$512,192							\$431,543	
DSM Portfolio Total						\$10,470,471							\$8,522,547	
Other Costs	ELECTRIC							GAS						
Emerging Markets						200,000							\$200,000	
Market Potential Study						\$							-	
Other Costs Subtotal						200,000							\$200,000	
DSM Portfolio Total including Other Costs						\$10,670,471							\$8,722,547	

TABLE H-5 2024 COMBINED PORTFOLIO TARGETS

Category	Number of Customers	Total kWh Savings	Total Peak Demand (MW)	ELECTRIC				GAS						
				Adopted	Implementation	Mean Use	Total Value	Customers	Total Savings	Adopted	Implementation	Mean Use	Total Value	
Residential														
Residential Lighting	14,089	977,297	19.66	\$107,621	\$38,416	\$92,287	\$238,324							
Residential Prescriptive	7,892	2,860,501	889.35	\$43,048	\$370,394	\$732,410	\$1,145,852	9,584	579,541	\$31,540	\$552,778	\$864,995	\$1,449,314	
Residential New Construction	71	156,812	101.51	\$5,381	\$48,144	\$13,975	\$67,500	1,428	612,092	\$3,943	\$558,080	\$737,775	\$1,299,797	
Home Energy Assessment	504	840,768	89.03	\$5,381	\$271,716	-	\$277,097	504	35,153	\$3,943	\$58,605	-	\$62,548	
Income-Qualified Weatherization	653	967,302	546.35	\$21,524	\$1,350,360	-	\$1,371,884	619	70,571	\$15,770	\$1,120,207	-	\$1,135,977	
Energy-Efficient Schools	2,600	670,800	93.60	\$21,524	\$106,392	-	\$127,916	2,600	38,480	\$23,655	\$35,464	-	\$59,119	
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$21,524	\$345,029	-	\$366,554	34,778	375,933	\$23,655	\$115,273	-	\$138,929	
Appliance Recycling	1,372	1,300,910	183.54	\$43,048	\$168,946	\$67,325	\$279,320							
CVR Residential	-	-	-	\$32,286	\$315,241	-	\$347,528							
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$21,524	\$596,000	\$176,000	\$793,524							
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$21,524	\$54,280	\$84,280	\$160,084							
Food Bank	3,156	649,158	46.71	\$21,524	\$9,703	-	\$31,227	3,156	20,814	\$15,770	\$4,851	-	\$20,622	
Home Energy Management Systems	1,000	515,000	80.00	\$10,762	\$245,940	-	\$256,702	1,000	54,400	\$11,828	\$198,260	-	\$210,088	
Multi-Family Direct Install								1,700	68,591	\$15,770	\$423,147	-	\$438,918	
Targeted Income								46	15,022	\$31,540	\$79,352	-	\$110,892	
Home Energy House Call-Integrated								1,122	49,144	\$31,540	\$191,295	-	\$222,835	
Neighborhood Program-Integrated								1,000	134,440	\$31,540	\$198,097	-	\$229,638	
Residential Subtotal	81,637	16,185,755	4,879.02	\$376,673	\$3,920,561	\$1,166,277	\$5,463,511	57,537	2,054,181	\$240,495	\$3,535,411	\$1,602,770	\$5,378,676	
Commercial & Industrial														
Commercial Prescriptive	55,739	18,058,503	4,572.95	\$59,191	\$791,792	\$1,394,674	\$2,245,657	1,712	402,215	\$70,966	\$611,299	\$335,962	\$1,018,227	
Commercial Custom	196	6,107,234	740.00	\$64,572	\$366,723	\$491,537	\$922,832	71	472,810	\$78,851	\$526,173	\$489,600	\$1,094,624	
Small Business	383	2,957,870	213.00	\$5,381	\$229,663	\$512,537	\$747,582	1,369	28,020	\$3,943	\$3,736	\$6,666	\$14,344	

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	Electric							Gas					
	Number of Participants	Total kWh Savings	Total kW Demand	Admin. Expenses	Implementation Expenses	Incentives	Total Budget	Number of Participants	Total kWh Savings	Admin. Expenses	Implementation Expenses	Incentives	Total Budget
CVR Commercial	-	-	-	\$32,286	\$216,561	-	\$248,848						
Commercial & Industrial Subtotal	56,318	27,123,608	5,525.95	\$161,431	\$1,604,739	\$2,398,748	\$4,164,919	3,152	903,045	\$153,759	\$1,141,208	\$832,228	\$2,127,195
Indirect Costs				ELECTRIC				GAS					
Contact Center							\$67,130						\$140,738
Online Audit							\$45,724						\$213,712
Outreach							\$436,877						\$569,925
Portfolio Costs Subtotal							\$549,730						\$924,375
Subtotal (Before Evaluation)							\$10,178,160						\$8,430,246
Evaluation							\$520,077						\$446,225
DSM Portfolio Total							\$10,698,237						\$8,876,471
Other Costs				ELECTRIC				GAS					
Emerging Markets							200,000						200,000
Market Potential Study							300,000						300,000
Other Costs Subtotal							500,000						500,000
DSM Portfolio Total including Other Costs							\$11,198,237						\$9,376,471

TABLE H -6 2025 COMBINED PORTFOLIO TARGETS

	Electric							Gas					
	Number of Participants	Total kWh Savings	Total kW Demand	Admin. Expenses	Implementation Expenses	Incentives	Total Budget	Number of Participants	Total kWh Savings	Admin. Expenses	Implementation Expenses	Incentives	Total Budget
Residential				ELECTRIC				GAS					
Residential Lighting	15,913	1,146,410	274.12	\$109,343	\$44,005	\$105,714	\$259,061						
Residential Prescriptive	8,136	2,974,980	961.29	\$43,737	\$376,320	\$767,435	\$1,187,492	9,591	577,456	\$32,045	\$561,623	\$864,845	\$1,458,513
Residential New Construction	70	154,792	100.29	\$5,467	\$46,909	\$13,800	\$66,176	1,592	681,668	\$4,006	\$620,174	\$819,500	\$1,443,680
Home Energy Assessment	504	790,845	83.15	\$5,467	\$276,063	-	\$281,530	504	35,153	\$4,006	\$59,543	-	\$63,549

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Program	ELECTRIC							GAS					
	Number of Participants	Total kWh Savings	Total \$/Year (Demand)	Admin.	Implementation	Incentives	Total Budget	Number of Participants	Scrubbed Savings	Admin.	Implementation	Incentives	Total Budget
Income-Qualified Weatherization	685	1,018,544	575.34	\$21,869	\$1,369,913	-	\$1,391,782	649	74,337	\$16,022	\$1,156,992	-	\$1,173,014
Energy-Efficient Schools	2,600	670,800	93.60	\$21,869	\$117,023	-	\$138,891	2,600	38,480	\$24,034	\$39,008	-	\$63,041
Residential Behavioral Savings	49,000	7,049,208	1,574.28	\$21,869	\$350,550	-	\$372,418	34,778	375,933	\$24,034	\$117,118	-	\$141,151
Appliance Recycling	1,253	1,180,913	171.99	\$43,737	\$155,651	\$61,050	\$260,438						
CVR Residential	-	-	-	\$32,803	\$282,073	-	\$314,876						
Smart Cycle (DLC Change Out)	1,000	198,000	1,015	\$21,869	\$616,000	\$196,000	\$833,869						
BYOT (Bring Your Own Thermostat)	300	-	240.00	\$21,869	\$62,280	\$92,280	\$176,429						
Food Bank	3,156	649,158	46.71	\$21,869	\$9,858	-	\$31,727	3,156	20,814	\$16,023	\$4,929	-	\$20,952
Home Energy Management Systems	1,000	515,000	80.00	\$10,934	\$266,980	-	\$277,914	1,000	54,400	\$12,017	\$214,420	-	\$226,437
Multi-Family Direct Install								1,700	68,591	\$16,022	\$429,918	-	\$445,940
Targeted Income								46	15,022	\$32,045	\$80,621	-	\$112,666
Home Energy House Call-Integrated								1,122	49,144	\$32,045	\$194,356	-	\$226,401
Neighborhood Program-Integrated								1,000	134,440	\$32,045	\$201,267	-	\$233,312
Residential Subtotal	83,617	16,348,650	5,215.76	\$382,700	\$3,973,626	\$1,236,279	\$5,592,604	57,738	2,125,438	\$244,343	\$3,679,968	\$1,684,345	\$5,608,656
Commercial & Industrial													
Commercial Prescriptive	53,882	17,825,085	4,513.77	\$60,139	\$797,128	\$1,331,794	\$2,189,060	1,964	439,398	\$72,101	\$737,459	\$363,357	\$1,172,917
Commercial Custom	196	6,107,234	740.00	\$65,606	\$372,590	\$491,537	\$929,733	71	472,810	\$80,112	\$534,591	\$489,600	\$1,104,304
Small Business	383	2,963,026	213.00	\$5,467	\$233,383	\$503,787	\$742,637	1,479	31,044	\$4,006	\$3,915	\$6,876	\$14,797
CVR Commercial	-	-	-	\$32,803	\$193,019	-	\$225,821						
Commercial & Industrial Subtotal	54,461	26,895,345	5,466.77	\$164,014	\$1,596,120	\$2,327,118	\$4,087,252	3,514	943,252	\$156,219	\$1,275,965	\$859,833	\$2,292,017
Indirect Costs													
Contact Center							\$68,204						\$142,990
Online Audit							\$46,456						\$217,131

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	Administrative	Savings	Programs	Admin.	Implementation	Investment	Total Budget	Programs	Admin.	Implementation	Investment	Total Budget	
Outreach							\$443,867					\$579,043	
Portfolio Costs Subtotal							\$558,526					\$939,165	
Subtotal (Before Evaluation)							\$10,238,382					\$8,839,838	
Evaluation							\$520,203					\$464,552	
DSM Portfolio Total							\$10,758,585					\$9,304,390	
Other Costs	ELECTRIC							GAS					
Emerging Markets							200,000					200,000	
Market Potential Study													
Other Costs Subtotal							200,000					200,000	
DSM Portfolio Total including Other Costs							\$10,958,585					\$9,504,390	

APPENDIX I *Action Plan Combined Gas & Electric Costs Summary*

The following tables present combined gas and electric costs for all residential programs for the years 2020-2025, with individual tables for each year. This is immediately followed by a table presenting the combined gas and electric costs for all commercial and industrial programs.

TABLE I-1 2020 COMBINED GAS AND ELECTRIC COSTS – RESIDENTIAL

Residential	ELECTRIC				GAS			
	Annual	Information	Identifies	Budget	Annual	Information	Identifies	Budget
Residential Lighting	\$101,000	\$186,419	\$463,014	\$750,433				
Residential Prescriptive	\$40,400	\$347,608	\$632,065	\$1,020,073	\$29,600	\$1,090,398	\$2,456,695	\$3,576,693
Residential New Construction	\$5,050	\$50,000	\$16,775	\$71,825	\$3,700	\$286,083	\$379,375	\$669,158
Home Energy Assessment	\$5,050	\$240,000	-	\$245,050	\$3,700	\$55,000	-	\$58,700
Income-Qualified Weatherization	\$20,200	\$1,275,176	-	\$1,295,376	\$14,800	\$872,202	-	\$887,002
Energy-Efficient Schools	\$20,200	\$113,589	-	\$133,789	\$22,200	\$28,397	-	\$50,597
Residential Behavioral Savings	\$40,400	\$323,803	-	\$364,203	\$37,000	\$108,182	-	\$145,182
Appliance Recycling	\$40,400	\$143,657	\$61,000	\$245,057				
CVR Residential	\$30,300	\$218,023	-	\$248,323				
Smart Cycle (DLC Change Out)	\$20,200	\$516,000	\$96,000	\$632,200				
BYOT (Bring Your Own Thermostat)	\$20,200	\$22,280	\$52,280	\$94,760				
Food Bank	-	-	-	-	-	-	-	-
Home Energy Management Systems	\$10,100	\$70,000	-	\$80,100	\$11,100	\$130,000	-	\$141,100
Multi-Family Direct Install					\$14,800	\$397,115	-	\$411,915
Targeted Income					\$29,600	\$74,470	-	\$104,070
Home Energy House Call- Integrated					\$29,600	\$179,527	-	\$209,127
Neighborhood Program- Integrated					\$29,600	\$185,910	-	\$215,510
Residential Subtotal	\$353,500	\$3,506,555	\$1,321,134	\$5,181,189	\$225,700	\$3,407,285	\$2,836,070	\$6,469,055

TABLE I -2 2020 COMBINED GAS AND ELECTRIC COSTS – COMMERCIAL & INDUSTRIAL

Commercial & Industrial	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Commercial Prescriptive	\$55,550	\$622,327	\$1,370,010	\$2,047,886	\$66,600	\$442,240	\$251,057	\$759,897
Commercial Custom	\$60,600	\$344,162	\$491,537	\$896,299	\$74,000	\$493,803	\$489,600	\$1,057,403
Small Business	\$5,050	\$215,618	\$548,167	\$768,835	\$3,700	\$3,096	\$5,886	\$12,682
CVR Commercial	\$30,300	\$148,233	-	\$178,533				
Commercial & Industrial Subtotal	\$151,500	\$1,330,340	\$2,409,714	\$3,891,554	\$144,300	\$939,139	\$746,543	\$1,829,982

TABLE I -3 2021 COMBINED GAS AND ELECTRIC COSTS – RESIDENTIAL

Residential	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Residential Lighting	\$102,616	\$189,402	\$455,001	\$747,018				
Residential Prescriptive	\$41,046	\$353,169	\$645,510	\$1,039,726	\$30,074	\$1,107,845	\$2,491,995	\$3,629,913
Residential New Construction	\$5,131	\$57,249	\$15,025	\$77,405	\$3,759	\$342,221	\$452,875	\$798,855
Home Energy Assessment	\$5,131	\$258,000	-	\$263,131	\$3,759	\$55,880	-	\$59,639
Income-Qualified Weatherization	\$20,523	\$1,293,527	-	\$1,314,050	\$15,037	\$885,268	-	\$900,304
Energy-Efficient Schools	\$20,523	\$117,253	-	\$137,776	\$22,555	\$29,313	-	\$51,868
Residential Behavioral Savings	\$20,523	\$328,984	-	\$349,507	\$22,555	\$109,913	-	\$132,468
Appliance Recycling	\$41,046	\$159,415	\$66,625	\$267,086				
CVR Residential	\$30,785	\$197,378	-	\$228,163				
Smart Cycle (DLC Change Out)	\$20,523	\$536,000	\$116,000	\$672,523				
BYOT (Bring Your Own Thermostat)	\$20,523	\$30,280	\$60,280	\$111,083				
Food Bank	\$20,523	\$92,517	-	\$113,041	\$15,037	\$4,626	-	\$19,663
Home Energy Management Systems	\$10,262	\$212,900	-	\$223,162	\$11,278	\$194,100	-	\$205,378

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	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Residential								
Multi-Family Direct Install					\$15,037	\$403,469	-	\$418,506
Targeted Income					\$30,074	\$75,662	-	\$105,735
Home Energy House Call- Integrated					\$30,074	\$182,399	-	\$212,473
Neighborhood Program- Integrated					\$30,074	\$188,885	-	\$218,959
Residential Subtotal	\$359,156	\$3,826,074	\$1,358,441	\$5,543,671	\$229,311	\$3,579,580	\$2,944,870	\$6,753,761

TABLE I-4 2021 COMBINED GAS AND ELECTRIC COSTS – COMMERCIAL & INDUSTRIAL

	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Commercial & Industrial								
Commercial Prescriptive	\$56,439	\$682,432	\$1,424,756	\$2,163,627	\$67,666	\$487,528	\$266,357	\$821,550
Commercial Custom	\$61,570	\$349,669	\$491,537	\$902,775	\$75,184	\$501,704	\$489,600	\$1,066,488
Small Business	\$5,131	\$219,172	\$539,573	\$763,876	\$3,759	\$3,209	\$6,006	\$12,975
CVR Commercial	\$30,785	\$133,547	-	\$164,332				
Commercial & Industrial Subtotal	\$153,924	\$1,384,820	\$2,455,867	\$3,994,610	\$146,609	\$992,441	\$761,963	\$1,901,012

TABLE I-5 2022 COMBINED GAS AND ELECTRIC COSTS – RESIDENTIAL

	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Residential								
Residential Lighting	\$104,258	\$144,380	\$346,846	\$595,484				
Residential Prescriptive	\$41,703	\$358,820	\$680,160	\$1,080,683	\$30,555	\$535,505	\$858,470	\$1,424,530
Residential New Construction	\$5,213	\$53,186	\$14,675	\$73,074	\$3,819	\$424,689	\$561,725	\$990,233
Home Energy Assessment	\$5,213	\$263,225	-	\$268,438	\$3,819	\$56,774	-	\$60,593
Income-Qualified Weatherization	\$20,852	\$1,312,171	-	\$1,333,023	\$15,277	\$980,165	-	\$995,443
Energy-Efficient Schools	\$20,852	\$92,229	-	\$113,080	\$22,916	\$30,743	-	\$53,659

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	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Residential								
Residential Behavioral Savings	\$20,852	\$334,248	-	\$355,099	\$22,916	\$111,671	-	\$134,587
Appliance Recycling	\$41,703	\$171,385	\$70,500	\$283,589				
CVR Residential	\$31,277	\$190,034	-	\$221,311				
Smart Cycle (DLC Change Out)	\$20,852	\$556,000	\$136,000	\$712,852				
BYOT (Bring Your Own Thermostat)	\$20,852	\$38,280	\$68,280	\$127,412				
Food Bank	\$20,852	\$18,800	-	\$39,651	\$15,278	\$4,700	-	\$19,977
Home Energy Management Systems	\$10,426	\$219,900	-	\$230,326	\$11,458	\$187,100	-	\$198,558
Multi-Family Direct Install					\$15,277	\$409,925	-	\$425,202
Targeted Income					\$30,555	\$76,872	-	\$107,427
Home Energy House Call- Integrated					\$30,555	\$185,318	-	\$215,872
Neighborhood Program- Integrated					\$30,555	\$191,907	-	\$222,462
Residential Subtotal	\$364,902	\$3,752,658	\$1,316,461	\$5,434,021	\$232,980	\$3,195,369	\$1,420,195	\$4,848,544

TABLE I -6 2022 COMBINED GAS AND ELECTRIC COSTS – COMMERCIAL & INDUSTRIAL

	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Commercial & Industrial								
Commercial Prescriptive	\$57,342	\$733,558	\$1,448,274	\$2,239,173	\$68,748	\$541,210	\$286,137	\$896,095
Commercial Custom	\$62,555	\$355,263	\$491,537	\$909,355	\$76,387	\$509,731	\$489,600	\$1,075,718
Small Business	\$5,213	\$222,721	\$530,824	\$758,758	\$3,819	\$3,375	\$6,216	\$13,410
CVR Commercial	\$31,277	\$128,261	-	\$159,538				
Commercial & Industrial Subtotal	\$156,387	\$1,439,803	\$2,470,635	\$4,066,825	\$148,955	\$1,054,315	\$781,953	\$1,985,223

TABLE I - 7 2023 COMBINED GAS AND ELECTRIC COSTS – RESIDENTIAL

Residential	ELECTRIC				GAS			
	Admin	Implementation	Incentives	Total Budget	Admin	Implementation	Incentives	Total Budget
Residential Lighting	\$105,926	\$32,756	\$78,689	\$217,370				
Residential Prescriptive	\$42,370	\$364,561	\$707,135	\$1,114,066	\$31,044	\$544,073	\$863,520	\$1,438,637
Residential New Construction	\$5,296	\$50,202	\$14,325	\$69,824	\$3,880	\$491,921	\$650,275	\$1,146,077
Home Energy Assessment	\$5,296	\$267,437	-	\$272,733	\$3,880	\$57,682	-	\$61,563
Income-Qualified Weatherization	\$21,185	\$1,331,114	-	\$1,352,299	\$15,522	\$1,060,825	-	\$1,076,347
Energy-Efficient Schools	\$21,185	\$98,274	-	\$119,460	\$23,283	\$32,758	-	\$56,041
Residential Behavioral Savings	\$21,185	\$339,596	-	\$360,781	\$23,283	\$113,458	-	\$136,741
Appliance Recycling	\$42,370	\$174,745	\$70,750	\$287,865				
CVR Residential	\$31,778	\$270,252	-	\$302,029				
Smart Cycle (DLC Change Out)	\$21,185	\$576,000	\$156,000	\$753,185				
BYOT (Bring Your Own Thermostat)	\$21,185	\$46,280	\$76,280	\$143,745				
Food Bank	\$21,185	\$9,550	-	\$30,735	\$15,522	\$4,775	-	\$20,297
Home Energy Management Systems	\$10,593	\$234,900	-	\$245,493	\$11,641	\$172,100	-	\$183,741
Multi-Family Direct Install					\$15,522	\$416,484	-	\$432,005
Targeted Income					\$31,044	\$78,102	-	\$109,146
Home Energy House Call- Integrated					\$31,044	\$188,283	-	\$219,326
Neighborhood Program- Integrated					\$31,044	\$194,978	-	\$226,021
Residential Subtotal	\$370,741	\$3,795,666	\$1,103,179	\$5,269,586	\$236,708	\$3,355,439	\$1,513,795	\$5,105,942

TABLE I -8 2023 COMBINED GAS AND ELECTRIC COSTS – COMMERCIAL & INDUSTRIAL

Commercial & Industrial	ELECTRIC				GAS			
	2023	2024	2025	Total Budget	2023	2024	2025	Total Budget
Commercial Prescriptive	\$58,259	\$769,435	\$1,434,660	\$2,262,354	\$69,848	\$598,626	\$307,777	\$976,251
Commercial Custom	\$63,556	\$360,948	\$491,537	\$916,040	\$77,609	\$517,886	\$489,600	\$1,085,096
Small Business	\$5,296	\$226,003	\$521,287	\$752,586	\$3,880	\$3,561	\$6,456	\$13,898
CVR Commercial	\$31,778	\$184,861	-	\$216,639				
Commercial & Industrial Subtotal	\$158,889	\$1,541,248	\$2,447,483	\$4,147,620	\$151,338	\$1,120,073	\$803,833	\$2,075,244

TABLE I -9 2024 COMBINED GAS AND ELECTRIC COSTS – RESIDENTIAL

Residential	ELECTRIC				GAS			
	2024	2025	2026	Total Budget	2024	2025	2026	Total Budget
Residential Lighting	\$107,621	\$38,416	\$92,287	\$238,324				
Residential Prescriptive	\$43,048	\$370,394	\$732,410	\$1,145,852	\$31,540	\$552,778	\$864,995	\$1,449,314
Residential New Construction	\$5,381	\$48,144	\$13,975	\$67,500	\$3,943	\$558,080	\$737,775	\$1,299,797
Home Energy Assessment	\$5,381	\$271,716	-	\$277,097	\$3,943	\$58,605	-	\$62,548
Income-Qualified Weatherization	\$21,524	\$1,350,360	-	\$1,371,884	\$15,770	\$1,120,207	-	\$1,135,977
Energy-Efficient Schools	\$21,524	\$106,392	-	\$127,916	\$23,655	\$35,464	-	\$59,119
Residential Behavioral Savings	\$21,524	\$345,029	-	\$366,554	\$23,655	\$115,273	-	\$138,929
Appliance Recycling	\$43,048	\$168,946	\$67,325	\$279,320				
CVR Residential	\$32,286	\$315,241	-	\$347,528				
Smart Cycle (DLC Change Out)	\$21,524	\$596,000	\$176,000	\$793,524				
BYOT (Bring Your Own Thermostat)	\$21,524	\$54,280	\$84,280	\$160,084				
Food Bank	\$21,524	\$9,703	-	\$31,227	\$15,770	\$4,851	-	\$20,622
Home Energy Management Systems	\$10,762	\$245,940	-	\$256,702	\$11,828	\$198,260	-	\$210,088
Multi-Family Direct Install					\$15,770	\$423,147	-	\$438,918

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Residential	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Targeted Income					\$31,540	\$79,352	-	\$110,892
Home Energy House Call- Integrated					\$31,540	\$191,295	-	\$222,835
Neighborhood Program- Integrated					\$31,540	\$198,097	-	\$229,638
Residential Subtotal	\$376,673	\$3,920,561	\$1,166,277	\$5,463,511	\$240,495	\$3,535,411	\$1,602,770	\$5,378,676

TABLE I -10 2024 COMBINED GAS AND ELECTRIC COSTS – COMMERCIAL & INDUSTRIAL

Commercial & Industrial	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Commercial Prescriptive	\$59,191	\$791,792	\$1,394,674	\$2,245,657	\$70,966	\$611,299	\$335,962	\$1,018,227
Commercial Custom	\$64,572	\$366,723	\$491,537	\$922,832	\$78,851	\$526,173	\$489,600	\$1,094,624
Small Business	\$5,381	\$229,663	\$512,537	\$747,582	\$3,943	\$3,736	\$6,666	\$14,344
CVR Commercial	\$32,286	\$216,561	-	\$248,848				
Commercial & Industrial Subtotal	\$161,431	\$1,604,739	\$2,398,748	\$4,164,919	\$153,759	\$1,141,208	\$832,228	\$2,127,195

TABLE I -11 2025 COMBINED GAS AND ELECTRIC COSTS – RESIDENTIAL

Residential	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Residential Lighting	\$109,343	\$44,005	\$105,714	\$259,061				
Residential Prescriptive	\$43,737	\$376,320	\$767,435	\$1,187,492	\$32,045	\$561,623	\$864,845	\$1,458,513
Residential New Construction	\$5,467	\$46,909	\$13,800	\$66,176	\$4,006	\$620,174	\$819,500	\$1,443,680
Home Energy Assessment	\$5,467	\$276,063	-	\$281,530	\$4,006	\$59,543	-	\$63,549
Income-Qualified Weatherization	\$21,869	\$1,369,913	-	\$1,391,782	\$16,022	\$1,156,992	-	\$1,173,014
Energy-Efficient Schools	\$21,869	\$117,023	-	\$138,891	\$24,034	\$39,008	-	\$63,041

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	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Residential								
Residential Behavioral Savings	\$21,869	\$350,550	-	\$372,418	\$24,034	\$117,118	-	\$141,151
Appliance Recycling	\$43,737	\$155,651	\$61,050	\$260,438				
CVR Residential	\$32,803	\$282,073	-	\$314,876				
Smart Cycle (DLC Change Out)	\$21,869	\$616,000	\$196,000	\$833,869				
BYOT (Bring Your Own Thermostat)	\$21,869	\$62,280	\$92,280	\$176,429				
Food Bank	\$21,869	\$9,858	-	\$31,727	\$16,023	\$4,929	-	\$20,952
Home Energy Management Systems	\$10,934	\$266,980	-	\$277,914	\$12,017	\$214,420	-	\$226,437
Multi-Family Direct Install					\$16,022	\$429,918	-	\$445,940
Targeted Income					\$32,045	\$80,621	-	\$112,666
Home Energy House Call- Integrated					\$32,045	\$194,356	-	\$226,401
Neighborhood Program- Integrated					\$32,045	\$201,267	-	\$233,312
Residential Subtotal	\$382,700	\$3,973,626	\$1,236,279	\$5,592,604	\$244,343	\$3,679,968	\$1,684,345	\$5,608,656

TABLE I -12 2025 COMBINED GAS AND ELECTRIC COSTS – COMMERCIAL & INDUSTRIAL

	ELECTRIC				GAS			
	Admin.	Implementation	Incentives	Total Budget	Admin.	Implementation	Incentives	Total Budget
Commercial & Industrial								
Commercial Prescriptive	\$60,139	\$797,128	\$1,331,794	\$2,189,060	\$72,101	\$737,459	\$363,357	\$1,172,917
Commercial Custom	\$65,606	\$372,590	\$491,537	\$929,733	\$80,112	\$534,591	\$489,600	\$1,104,304
Small Business	\$5,467	\$233,383	\$503,787	\$742,637	\$4,006	\$3,915	\$6,876	\$14,797
CVR Commercial	\$32,803	\$193,019	-	\$225,821				
Commercial & Industrial Subtotal	\$164,014	\$1,596,120	\$2,327,118	\$4,087,252	\$156,219	\$1,275,965	\$859,833	\$2,292,017

APPENDIX J Action Plan Market Research

RESIDENTIAL SURVEY RESULTS

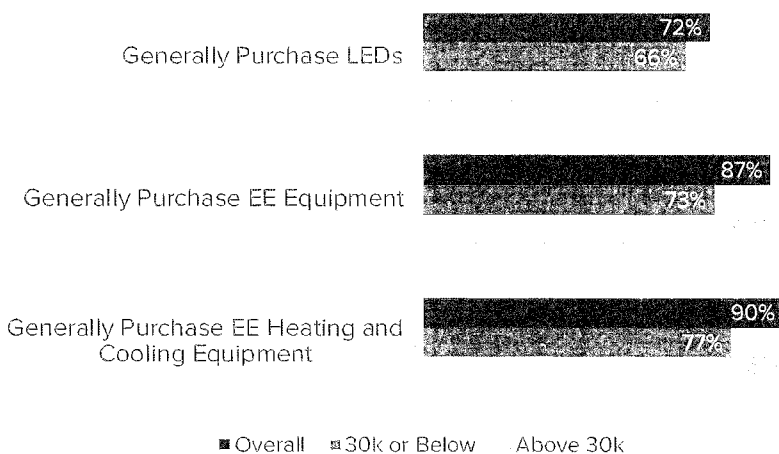
Background

The team completed an online survey of 466 residential customers in Vectren service territory. The survey was completed between June 25 and July 9, 2018. Vectren randomly sampled 4,000 residential customers and sent invitations to complete the survey by email. Customers were offered a \$25 incentive upon completion of the survey.

Results

Customers generally reported purchasing energy-efficient equipment (72%, as seen below). As expected, fewer lower income customers (66%) reported purchasing energy-efficient equipment than those making higher incomes (74%).

FIGURE J-1 GENERAL PURCHASING BEHAVIOR



Most electric customers did not plan on purchasing any of the equipment discussed in the survey over the next year (76%) or in the next four years (63%). Electric customers most often report planning on purchasing smart thermostats (16%) or central air conditioners (16%) in the next four years.

FIGURE J-2 PLANNED IMPROVEMENTS



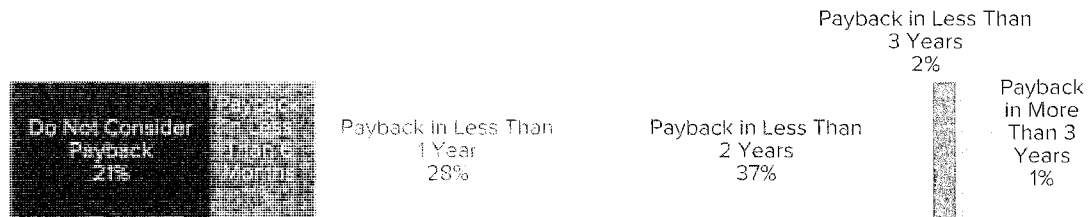
Generally customers reported a lower willingness to pay for weatherization measures and a higher willingness to pay for energy-efficient appliances, as seen in the table below.

FIGURE J-3 WILLINGNESS TO PAY AT VARYING REBATE LEVELS (PERCENT OF INCREMENTAL COST)

Sector	End-Use / Technology	25%	50%	75%	100%
Average Likelihood					
Weatherization	Weatherization	75%	86%	91%	96%
	Weatherization	76%	84%	90%	96%
	Weatherization	61%	72%	82%	93%
Extreme Likelihood (as the respondent's top)					
Weatherization	Weatherization	31%	50%	61%	85%
	Weatherization	27%	39%	53%	83%
	Weatherization	16%	20%	29%	75%

Less than one quarter of customers do not consider the payback timeframe of their energy efficiency equipment (21%, as seen below). About three quarters require a payback of two years or less.

FIGURE J-4 RESIDENTIAL REQUIRED PAYBACK PERIOD



COMMERCIAL & INDUSTRIAL ONSITE VISIT RESULTS

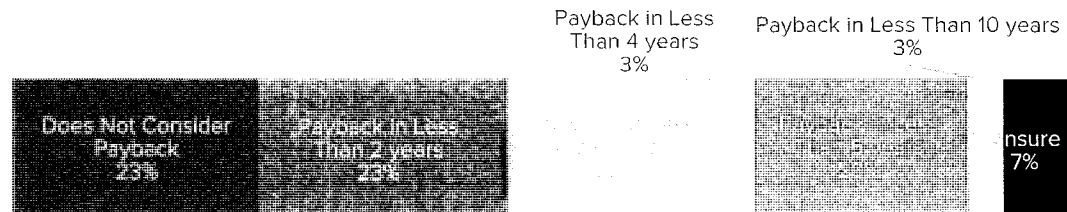
Background

The team completed an audit of 36 commercial and industrial sites in Vectren territory. During these audits, the team asked the company contact questions regarding their energy efficient product purchases and preferences.

Results

Similar to residential customers, about one-quarter of commercial and industrial customers do not consider the payback period of their energy efficiency equipment (23%, as seen below).

FIGURE J-5 COMMERCIAL & INDUSTRIAL REQUIRED PAYBACK PERIOD



Commercial and industrial customers most often reported receiving an incentive as a consideration when purchasing new energy efficient equipment (72%, as seen in the table below). Other regularly reported considerations included lowering monthly electric bills (67%) and increased employee comfort (58%).

TABLE J-6 IMPORTANT CONSIDERATIONS REGARDING ENERGY EFFICIENT EQUIPMENT

Response	Percentage
Receiving incentive	72%
Lower monthly electric bills	67%
Increased level of employee comfort	58%
Financing options	50%
Improving the image or value of business	36%
Recommendation of sales person, contractor, or consultant	28%
Helping to protect the environment	8%
Other	3%

Commercial and industrial customers most often reported that cost was a barrier to purchasing energy-efficient equipment (67%), followed by the performance of the equipment (44%).

TABLE J-7 BARRIERS TO PURCHASING ENERGY EFFICIENT EQUIPMENT

Response	Percentage
Cost	67%
Performance of the equipment	44%
Lack of product energy savings information	39%
Payback/ROI	31%
Lack of financing options	17%
Availability of equipment	11%
Other	6%

Commercial and industrial customers reported a higher willingness to purchase more expensive equipment at most levels of rebate incremental cost than residential customers, as seen in the table below.

TABLE J-8 WILLINGNESS TO PAY AT VARYING REBATE LEVELS (PERCENT OF INCREMENTAL COST)

Equipment Price	0%	25%	50%	75%
Equipment Priced Below \$200	6%	3%	11%	77%
Equipment Priced Above \$1,000	6%	11%	34%	97%

APPENDIX K *Action Plan Measure Library*

The following table provides a list of all the measures included in the Action Plan program concepts, broken up by year of the program.

TABLE K-1 MEASURE LIBRARY

Program	Measure	Description	2019	2021	2022	2023	2024	2025
Residential Lighting	Standard Units	Participation	159,553	180,887	-	-	-	-
Residential Lighting	Standard Units	Total Incentive Budget	\$120,861	\$128,882	-	-	-	-
Residential Lighting	Standard Units	Total Gross Incremental Savings (kwh)	5,143,874	5,862,548	-	-	-	-
Residential Lighting	Standard Units	NTG	0.84	0.79	-	-	-	-
Residential Lighting	Standard Units	Incremental Cost	\$3.00	\$3.00	-	-	-	-
Residential Lighting	Specialty Units	Participation	64,893	73,570	81,379	-	-	-
Residential Lighting	Specialty Units	Total Incentive Budget	\$259,896	\$275,336	\$281,978	-	-	-
Residential Lighting	Specialty Units	Total Gross Incremental Savings (kwh)	1,945,811	2,209,028	2,446,622	-	-	-
Residential Lighting	Specialty Units	NTG	0.84	0.79	0.74	-	-	-
Residential Lighting	Specialty Units	Incremental Cost	\$4.00	\$4.00	\$4.00	-	-	-
Residential Lighting	LED Fixtures	Participation	13,700	4,935	5,169	5,351	5,489	5,593
Residential Lighting	LED Fixtures	Total Incentive Budget	\$69,356	\$24,983	\$26,168	\$27,089	\$27,788	\$28,315

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Lighting	LED Fixtures	Total Gross Incremental Savings (kwh)	832,872	299,999	314,224	141,855	145,513	148,270
Residential Lighting	LED Fixtures	NTG	0.84	0.84	0.84	0.84	0.84	0.84
Residential Lighting	LED Fixtures	Incremental Cost	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Residential Lighting	Exterior Lighting Controls	Participation	1,720	3,440	5,160	6,880	8,600	10,320
Residential Lighting	Exterior Lighting Controls	Total Incentive Budget	\$12,900	\$25,800	\$38,700	\$51,599	\$64,499	\$77,399
Residential Lighting	Exterior Lighting Controls	Total Gross Incremental Savings (kwh)	166,357	332,713	499,070	665,427	831,783	998,140
Residential Lighting	Exterior Lighting Controls	NTG	0.84	0.84	0.84	0.84	0.84	0.84
Residential Lighting	Exterior Lighting Controls	Incremental Cost	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
Residential Prescriptive	Air Source Heat Pump 16 SEER	Participation	40	47	53	59	64	68
Residential Prescriptive	Air Source Heat Pump 16 SEER	Total Incentive Budget	\$12,000	\$14,100	\$15,900	\$17,700	\$19,200	\$20,400
Residential Prescriptive	Air Source Heat Pump 16 SEER	Total Gross Incremental Savings (kwh)	27,760	32,618	36,782	40,946	44,416	47,192
Residential Prescriptive	Air Source Heat Pump 16 SEER	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Air Source Heat Pump 16 SEER	Incremental Cost	\$870.00	\$870.00	\$870.00	\$870.00	\$870.00	\$870.00

Program	Measure	Description	2019	2021	2022	2023	2024	2025
Residential Prescriptive	Air Source Heat Pump 18 SEER	Participation	13	16	18	20	23	25
Residential Prescriptive	Air Source Heat Pump 18 SEER	Total Incentive Budget	\$7,800	\$9,600	\$10,800	\$12,000	\$13,800	\$15,000
Residential Prescriptive	Air Source Heat Pump 18 SEER	Total Gross Incremental Savings (kwh)	16,822	20,704	23,292	25,880	29,762	32,350
Residential Prescriptive	Air Source Heat Pump 18 SEER	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Air Source Heat Pump 18 SEER	Incremental Cost	\$870.00	\$870.00	\$870.00	\$870.00	\$870.00	\$870.00
Residential Prescriptive	Attic Insulation - Elec Heated South (Electric Only)	Participation	16	17	13	10	7	5
Residential Prescriptive	Attic Insulation - Elec Heated South (Electric Only)	Total Incentive Budget	\$7,200	\$7,650	\$5,850	\$4,500	\$3,150	\$2,250
Residential Prescriptive	Attic Insulation - Elec Heated South (Electric Only)	Total Gross Incremental Savings (kwh)	12,836	13,638	10,429	8,023	5,616	4,011
Residential Prescriptive	Attic Insulation - Elec Heated South (Electric Only)	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Attic Insulation - Elec Heated South (Electric Only)	Incremental Cost	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00
Residential Prescriptive	Attic Insulation - Gas Heated South (Dual -- Gas & Electric)	Participation	36	8	6	5	4	3
Residential Prescriptive	Attic Insulation - Gas Heated South (Dual -- Gas & Electric)	Total Incentive Budget	\$10,800	\$2,400	\$1,800	\$1,500	\$1,200	\$900

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Attic Insulation - Gas Heated South (Dual -- Gas & Electric)	Total Gross Incremental Savings (kwh)	8,602	1,912	1,434	1,195	956	717
Residential Prescriptive	Attic Insulation - Gas Heated South (Dual -- Gas & Electric)	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Attic Insulation - Gas Heated South (Dual -- Gas & Electric)	Incremental Cost	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00
Residential Prescriptive	Central Air Conditioner 16 SEER	Participation	708	528	632	736	834	923
Residential Prescriptive	Central Air Conditioner 16 SEER	Total Incentive Budget	\$141,680	\$105,600	\$126,400	\$147,200	\$166,800	\$184,600
Residential Prescriptive	Central Air Conditioner 16 SEER	Total Gross Incremental Savings (kwh)	212,326	158,255	189,427	220,598	249,971	276,647
Residential Prescriptive	Central Air Conditioner 16 SEER	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Central Air Conditioner 16 SEER	Incremental Cost	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00
Residential Prescriptive	Central Air Conditioner 18 SEER	Participation	84	62	74	86	98	108
Residential Prescriptive	Central Air Conditioner 18 SEER	Total Incentive Budget	\$41,800	\$31,000	\$37,000	\$43,000	\$49,000	\$54,000
Residential Prescriptive	Central Air Conditioner 18 SEER	Total Gross Incremental Savings (kwh)	57,819	42,880	51,179	59,479	67,778	74,694
Residential Prescriptive	Central Air Conditioner 18 SEER	NTG	0.52	0.52	0.52	0.52	0.52	0.52

Program	Measure	Description	2019	2021	2022	2023	2024	2025
Residential Prescriptive	Central Air Conditioner 18 SEER	Incremental Cost	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00
Residential Prescriptive	Dual Fuel Air Source Heat Pump 16 SEER	Participation	37	44	51	57	64	70
Residential Prescriptive	Dual Fuel Air Source Heat Pump 16 SEER	Total Incentive Budget	\$11,100	\$13,200	\$15,300	\$17,100	\$19,200	\$21,000
Residential Prescriptive	Dual Fuel Air Source Heat Pump 16 SEER	Total Gross Incremental Savings (kwh)	12,136	14,432	16,728	18,696	20,992	22,960
Residential Prescriptive	Dual Fuel Air Source Heat Pump 16 SEER	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Dual Fuel Air Source Heat Pump 16 SEER	Incremental Cost	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00
Residential Prescriptive	Duct Sealing Electric Heat Pump - South (Electric Only)	Participation	48	79	71	61	50	40
Residential Prescriptive	Duct Sealing Electric Heat Pump - South (Electric Only)	Total Incentive Budget	\$14,400	\$23,700	\$21,300	\$18,300	\$15,000	\$12,000
Residential Prescriptive	Duct Sealing Electric Heat Pump - South (Electric Only)	Total Gross Incremental Savings (kwh)	39,792	65,491	58,859	50,569	41,450	33,160
Residential Prescriptive	Duct Sealing Electric Heat Pump - South (Electric Only)	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Duct Sealing Electric Heat Pump - South (Electric Only)	Incremental Cost	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00

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Program	Measures	Description	2019	2021	2022	2023	2024	2025
Residential Prescriptive	Duct Sealing Electric Resistive Furnace - South (Electric Only)	Participation	38	64	57	49	40	32
Residential Prescriptive	Duct Sealing Electric Resistive Furnace - South (Electric Only)	Total Incentive Budget	\$11,400	\$19,200	\$17,100	\$14,700	\$12,000	\$9,600
Residential Prescriptive	Duct Sealing Electric Resistive Furnace - South (Electric Only)	Total Gross Incremental Savings (kwh)	51,642	86,976	77,463	66,591	54,360	43,488
Residential Prescriptive	Duct Sealing Electric Resistive Furnace - South (Electric Only)	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Duct Sealing Electric Resistive Furnace - South (Electric Only)	Incremental Cost	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00
Residential Prescriptive	Duct Sealing Gas Heating with A/C - South (Dual -- Gas & Electric)	Participation	232	384	346	297	245	196
Residential Prescriptive	Duct Sealing Gas Heating with A/C - South (Dual -- Gas & Electric)	Total Incentive Budget	\$34,800	\$57,600	\$51,900	\$44,550	\$36,750	\$29,400
Residential Prescriptive	Duct Sealing Gas Heating with A/C - South (Dual -- Gas & Electric)	Total Gross Incremental Savings (kwh)	38,365	63,500	57,216	49,113	40,514	32,411
Residential Prescriptive	Duct Sealing Gas Heating with A/C - South (Dual -- Gas & Electric)	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Duct Sealing Gas Heating with A/C - South (Dual -- Gas & Electric)	Incremental Cost	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Ductless Heat Pump 17 SEER 9.5 HSPF	Participation	8	9	11	12	13	14
Residential Prescriptive	Ductless Heat Pump 17 SEER 9.5 HSPF	Total Incentive Budget	\$4,000	\$4,500	\$5,500	\$6,000	\$6,500	\$7,000
Residential Prescriptive	Ductless Heat Pump 17 SEER 9.5 HSPF	Total Gross Incremental Savings (kwh)	28,998	32,623	39,872	43,497	47,122	50,747
Residential Prescriptive	Ductless Heat Pump 17 SEER 9.5 HSPF	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Ductless Heat Pump 17 SEER 9.5 HSPF	Incremental Cost	\$1,666.67	\$1,666.67	\$1,666.67	\$1,666.67	\$1,666.67	\$1,666.67
Residential Prescriptive	Ductless Heat Pump 19 SEER 9.5 HSPF	Participation	18	21	24	26	29	31
Residential Prescriptive	Ductless Heat Pump 19 SEER 9.5 HSPF	Total Incentive Budget	\$9,000	\$10,500	\$12,000	\$13,000	\$14,500	\$15,500
Residential Prescriptive	Ductless Heat Pump 19 SEER 9.5 HSPF	Total Gross Incremental Savings (kwh)	66,147	77,172	88,196	95,546	106,571	113,920
Residential Prescriptive	Ductless Heat Pump 19 SEER 9.5 HSPF	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Ductless Heat Pump 19 SEER 9.5 HSPF	Incremental Cost	\$2,333.33	\$2,333.33	\$2,333.33	\$2,333.33	\$2,333.33	\$2,333.33
Residential Prescriptive	Ductless Heat Pump 21 SEER 10.0 HSPF	Participation	8	9	11	12	13	14
Residential Prescriptive	Ductless Heat Pump 21 SEER 10.0 HSPF	Total Incentive Budget	\$6,000	\$6,750	\$8,250	\$9,000	\$9,750	\$10,500
Residential Prescriptive	Ductless Heat Pump 21 SEER 10.0 HSPF	Total Gross Incremental Savings (kwh)	30,158	33,927	41,467	45,237	49,006	52,776

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Ductless Heat Pump 21 SEER 10.0 HSPF	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Ductless Heat Pump 21 SEER 10.0 HSPF	Incremental Cost	\$2,833.33	\$2,833.33	\$2,833.33	\$2,833.33	\$2,833.33	\$2,833.33
Residential Prescriptive	Ductless Heat Pump 23 SEER 10.0 HSPF	Participation	26	30	34	38	42	45
Residential Prescriptive	Ductless Heat Pump 23 SEER 10.0 HSPF	Total Incentive Budget	\$19,500	\$22,500	\$25,500	\$28,500	\$31,500	\$33,750
Residential Prescriptive	Ductless Heat Pump 23 SEER 10.0 HSPF	Total Gross Incremental Savings (kwh)	94,640	109,200	123,760	138,320	152,880	163,800
Residential Prescriptive	Ductless Heat Pump 23 SEER 10.0 HSPF	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Ductless Heat Pump 23 SEER 10.0 HSPF	Incremental Cost	\$3,333.33	\$3,333.33	\$3,333.33	\$3,333.33	\$3,333.33	\$3,333.33
Residential Prescriptive	Dual Fuel Air Source Heat Pump 18 SEER	Participation	12	16	21	26	32	39
Residential Prescriptive	Dual Fuel Air Source Heat Pump 18 SEER	Total Incentive Budget	\$6,000	\$8,000	\$10,500	\$13,000	\$16,000	\$19,500
Residential Prescriptive	Dual Fuel Air Source Heat Pump 18 SEER	Total Gross Incremental Savings (kwh)	10,680	14,240	18,690	23,140	28,480	34,710
Residential Prescriptive	Dual Fuel Air Source Heat Pump 18 SEER	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Dual Fuel Air Source Heat Pump 18 SEER	Incremental Cost	\$1,666.67	\$1,666.67	\$1,666.67	\$1,666.67	\$1,666.67	\$1,666.67
Residential Prescriptive	Heat Pump Water Heater	Participation	28	36	45	56	67	78

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Program	Measure	Description	2019	2021	2022	2023	2024	2025
Residential Prescriptive	Heat Pump Water Heater	Total Incentive Budget	\$11,200	\$14,400	\$18,000	\$22,400	\$26,800	\$31,200
Residential Prescriptive	Heat Pump Water Heater	Total Gross Incremental Savings (kwh)	66,304	85,248	106,560	132,608	158,656	184,704
Residential Prescriptive	Heat Pump Water Heater	NTG	0.63	0.63	0.63	0.63	0.63	0.63
Residential Prescriptive	Heat Pump Water Heater	Incremental Cost	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00
Residential Prescriptive	Nest On-Line Store South (Electric Only)	Participation	64	64	64	64	64	64
Residential Prescriptive	Nest On-Line Store South (Electric Only)	Total Incentive Budget	\$4,800	\$4,800	\$4,800	\$4,800	\$4,800	\$4,800
Residential Prescriptive	Nest On-Line Store South (Electric Only)	Total Gross Incremental Savings (kwh)	58,455	58,455	58,455	58,455	58,455	58,455
Residential Prescriptive	Nest On-Line Store South (Electric Only)	NTG	0.55	0.55	0.55	0.55	0.55	0.55
Residential Prescriptive	Nest On-Line Store South (Electric Only)	Incremental Cost	\$39.16	\$39.16	\$39.16	\$39.16	\$39.16	\$39.16
Residential Prescriptive	Nest On-Line Store South (Dual -- Electric)	Participation	176	176	176	176	176	176
Residential Prescriptive	Nest On-Line Store South (Dual -- Electric)	Total Incentive Budget	\$10,560	\$10,560	\$10,560	\$10,560	\$10,560	\$10,560
Residential Prescriptive	Nest On-Line Store South (Dual -- Electric)	Total Gross Incremental Savings (kwh)	51,470	51,470	51,470	51,470	51,470	51,470
Residential Prescriptive	Nest On-Line Store South (Dual -- Electric)	NTG	0.55	0.55	0.55	0.55	0.55	0.55

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Nest On-Line Store South (Dual -- Electric)	Incremental Cost	\$175.00	\$175.00	\$175.00	\$175.00	\$175.00	\$175.00
Residential Prescriptive	Wifi Thermostat - South (Electric)	Participation	720	720	720	720	720	720
Residential Prescriptive	Wifi Thermostat - South (Electric)	Total Incentive Budget	\$36,000	\$36,000	\$36,000	\$36,000	\$36,000	\$36,000
Residential Prescriptive	Wifi Thermostat - South (Electric)	Total Gross Incremental Savings (kwh)	291,665	291,665	291,665	291,665	291,665	291,665
Residential Prescriptive	Wifi Thermostat - South (Electric)	NTG	0.73	0.73	0.73	0.73	0.73	0.73
Residential Prescriptive	Wifi Thermostat - South (Electric)	Incremental Cost	\$20.64	\$20.64	\$20.64	\$20.64	\$20.64	\$20.64
Residential Prescriptive	Smart Programmable Thermostat - South (Electric)	Participation	1,478	1,478	1,478	1,478	1,478	1,478
Residential Prescriptive	Smart Programmable Thermostat - South (Electric)	Total Incentive Budget	\$110,850	\$110,850	\$110,850	\$110,850	\$110,850	\$110,850
Residential Prescriptive	Smart Programmable Thermostat - South (Electric)	Total Gross Incremental Savings (kwh)	729,085	729,085	729,085	729,085	729,085	729,085
Residential Prescriptive	Smart Programmable Thermostat - South (Electric)	NTG	0.55	0.55	0.55	0.55	0.55	0.55
Residential Prescriptive	Smart Programmable Thermostat - South (Electric)	Incremental Cost	\$39.16	\$39.16	\$39.16	\$39.16	\$39.16	\$39.16

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Variable Speed Pool Pump	Participation	18	28	36	45	56	67
Residential Prescriptive	Variable Speed Pool Pump	Total Incentive Budget	\$5,400	\$8,400	\$10,800	\$13,500	\$16,800	\$20,100
Residential Prescriptive	Variable Speed Pool Pump	Total Gross Incremental Savings (kwh)	21,106	32,832	42,213	52,766	65,664	78,562
Residential Prescriptive	Variable Speed Pool Pump	NTG	0.63	0.63	0.63	0.63	0.63	0.63
Residential Prescriptive	Variable Speed Pool Pump	Incremental Cost	\$750.00	\$750.00	\$750.00	\$750.00	\$750.00	\$750.00
Residential Prescriptive	Wall Insulation - Elec Heated	Participation	5	5	5	5	5	5
Residential Prescriptive	Wall Insulation - Elec Heated	Total Incentive Budget	\$2,250	\$2,250	\$2,250	\$2,250	\$2,250	\$2,250
Residential Prescriptive	Wall Insulation - Elec Heated	Total Gross Incremental Savings (kwh)	4,447	4,447	4,447	4,447	4,447	4,447
Residential Prescriptive	Wall Insulation - Elec Heated	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Wall Insulation - Elec Heated	Incremental Cost	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00
Residential Prescriptive	Wall Insulation - Gas Heated - South (Electric)	Participation	32	32	32	32	32	32
Residential Prescriptive	Wall Insulation - Gas Heated - South (Electric)	Total Incentive Budget	\$7,200	\$7,200	\$7,200	\$7,200	\$7,200	\$7,200
Residential Prescriptive	Wall Insulation - Gas Heated - South (Electric)	Total Gross Incremental Savings (kwh)	1,876	1,876	1,876	1,876	1,876	1,876

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Wall Insulation - Gas Heated - South (Electric)	NTG	0.76	0.76	0.76	0.76	0.76	0.76
Residential Prescriptive	Wall Insulation - Gas Heated - South (Electric)	Incremental Cost	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00
Residential Prescriptive	AC Tune Up	Participation	3,344	3,511	3,326	2,994	2,573	2,639
Residential Prescriptive	AC Tune Up	Total Incentive Budget	\$83,600	\$87,775	\$83,150	\$74,850	\$64,325	\$65,975
Residential Prescriptive	AC Tune Up	Total Gross Incremental Savings (kwh)	371,184	389,721	369,186	332,334	285,603	292,929
Residential Prescriptive	AC Tune Up	NTG	-	-	-	-	-	-
Residential Prescriptive	AC Tune Up	Incremental Cost	\$64.00	\$64.00	\$64.00	\$64.00	\$64.00	\$64.00
Residential Prescriptive	ASHP Tune Up	Participation	26	71	67	60	52	53
Residential Prescriptive	ASHP Tune Up	Total Incentive Budget	\$1,300	\$3,550	\$3,350	\$3,000	\$2,600	\$2,650
Residential Prescriptive	ASHP Tune Up	Total Gross Incremental Savings (kwh)	8,195	22,379	21,119	18,912	16,391	16,706
Residential Prescriptive	ASHP Tune Up	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Residential Prescriptive	ASHP Tune Up	Incremental Cost	\$64.00	\$64.00	\$64.00	\$64.00	\$64.00	\$64.00
Residential Prescriptive	Air Purifier	Participation	100	160	181	200	217	231

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Air Purifier	Total Incentive Budget	\$2,500	\$4,000	\$4,525	\$5,000	\$5,425	\$5,775
Residential Prescriptive	Air Purifier	Total Gross Incremental Savings (kwh)	48,800	78,080	88,328	97,600	105,896	112,728
Residential Prescriptive	Air Purifier	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	Air Purifier	Incremental Cost	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00
Residential Prescriptive	ENERGY STAR Dehumidifier	Participation	368	368	368	368	368	368
Residential Prescriptive	ENERGY STAR Dehumidifier	Total Incentive Budget	\$9,200	\$9,200	\$9,200	\$9,200	\$9,200	\$9,200
Residential Prescriptive	ENERGY STAR Dehumidifier	Total Gross Incremental Savings (kwh)	70,766	70,766	70,766	70,766	70,766	70,766
Residential Prescriptive	ENERGY STAR Dehumidifier	NTG	0.52	0.52	0.52	0.52	0.52	0.52
Residential Prescriptive	ENERGY STAR Dehumidifier	Incremental Cost	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00	\$70.00
Residential Prescriptive	ENERGY STAR Clothes Washer	Participation	56	56	70	76	81	84
Residential Prescriptive	ENERGY STAR Clothes Washer	Total Incentive Budget	\$1,400	\$1,400	\$1,750	\$1,900	\$2,025	\$2,100
Residential Prescriptive	ENERGY STAR Clothes Washer	Total Gross Incremental Savings (kwh)	6,272	6,272	7,840	8,512	9,072	9,408
Residential Prescriptive	ENERGY STAR Clothes Washer	NTG	0.68	0.68	0.68	0.68	0.68	0.68

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Program	Measure	Description	2019	2021	2022	2023	2024	2025
Residential Prescriptive	ENERGY STAR Clothes Washer	Incremental Cost	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00
Residential Prescriptive	Smart/CEE Tier3 Clothes Washer	Participation	78	78	141	184	238	299
Residential Prescriptive	Smart/CEE Tier3 Clothes Washer	Total Incentive Budget	\$3,900	\$3,900	\$7,050	\$9,200	\$11,900	\$14,950
Residential Prescriptive	Smart/CEE Tier3 Clothes Washer	Total Gross Incremental Savings (kwh)	16,302	16,302	29,469	38,456	49,742	62,491
Residential Prescriptive	Smart/CEE Tier3 Clothes Washer	NTG	0.68	0.68	0.68	0.68	0.68	0.68
Residential Prescriptive	Smart/CEE Tier3 Clothes Washer	Incremental Cost	\$300.00	\$300.00	\$300.00	\$300.00	\$300.00	\$300.00
Residential Prescriptive	ENERGY STAR Room Air Conditioner	Participation	121	121	121	121	121	121
Residential Prescriptive	ENERGY STAR Room Air Conditioner	Total Incentive Budget	\$3,025	\$3,025	\$3,025	\$3,025	\$3,025	\$3,025
Residential Prescriptive	ENERGY STAR Room Air Conditioner	Total Gross Incremental Savings (kwh)	4,979	4,979	4,979	4,979	4,979	4,979
Residential Prescriptive	ENERGY STAR Room Air Conditioner	NTG	0.80	0.80	0.80	0.80	0.80	0.80
Residential Prescriptive	ENERGY STAR Room Air Conditioner	Incremental Cost	\$40.00	\$40.00	\$40.00	\$40.00	\$40.00	\$40.00
Residential Prescriptive	Clothes Dryer	Participation	28	38	51	67	86	108
Residential Prescriptive	Clothes Dryer	Total Incentive Budget	\$1,400	\$1,900	\$2,550	\$3,350	\$4,300	\$5,400

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Residential Prescriptive	Clothes Dryer	Total Gross Incremental Savings (kwh)	5,519	7,483	10,031	13,159	16,860	21,125
Residential Prescriptive	Clothes Dryer	NTG	0.68	0.68	0.68	0.68	0.68	0.68
Residential Prescriptive	Clothes Dryer	Incremental Cost	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00
Residential New Construction	Gold Star HERS Index Score 63	Participation	17	15	13	11	9	8
Residential New Construction	Gold Star HERS Index Score 63	Total Incentive Budget	\$2,975	\$2,625	\$2,275	\$1,925	\$1,575	\$1,400
Residential New Construction	Gold Star HERS Index Score 63	Total Gross Incremental Savings (kwh)	34,340	30,300	26,260	22,220	18,180	16,160
Residential New Construction	Gold Star HERS Index Score 63	NTG	0.50	0.50	0.50	0.50	0.50	0.50
Residential New Construction	Gold Star HERS Index Score 63	Incremental Cost	\$2,038.73	\$2,038.73	\$2,038.73	\$2,038.73	\$2,038.73	\$2,038.73
Residential New Construction	Platinum Star HERS Index Score 60	Participation	69	62	62	62	62	62
Residential New Construction	Platinum Star HERS Index Score 60	Total Incentive Budget	\$13,800	\$12,400	\$12,400	\$12,400	\$12,400	\$12,400
Residential New Construction	Platinum Star HERS Index Score 60	Total Gross Incremental Savings (kwh)	154,284	138,632	138,632	138,632	138,632	138,632
Residential New Construction	Platinum Star HERS Index Score 60	NTG	0.50	0.50	0.50	0.50	0.50	0.50
Residential New Construction	Platinum Star HERS Index Score 60	Incremental Cost	\$2,428.73	\$2,428.73	\$2,428.73	\$2,428.73	\$2,428.73	\$2,428.73

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Attic Insulation - Electric Resistance Heated	Participation	13	14	15	16	17	18
Income Qualified Weatherization	Attic Insulation - Electric Resistance Heated	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Attic Insulation - Electric Resistance Heated	Total Gross Incremental Savings (kwh)	10,764	11,592	12,420	13,248	14,076	14,904
Income Qualified Weatherization	Attic Insulation - Electric Resistance Heated	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Attic Insulation - Electric Resistance Heated	Incremental Cost	\$1,412.60	\$1,412.60	\$1,412.60	\$1,412.60	\$1,412.60	\$1,412.60
Income Qualified Weatherization	Attic Insulation - Gas Heated (Electric)	Participation	131	138	145	153	161	170
Income Qualified Weatherization	Attic Insulation - Gas Heated (Electric)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Attic Insulation - Gas Heated (Electric)	Total Gross Incremental Savings (kwh)	18,209	19,182	20,155	21,267	22,379	23,630
Income Qualified Weatherization	Attic Insulation - Gas Heated (Electric)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Attic Insulation - Gas Heated (Electric)	Incremental Cost	\$706.30	\$706.30	\$706.30	\$706.30	\$706.30	\$706.30
Income Qualified Weatherization	Audit Recommendations - Dual (Electric)	Participation	340	357	374	392	411	431
Income Qualified Weatherization	Audit Recommendations - Dual (Electric)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Audit Recommendations - Dual (Electric)	Total Gross Incremental Savings (kwh)	23,120	24,276	25,432	26,656	27,948	29,308

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Audit Recommendations - Dual (Electric)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Audit Recommendations - Dual (Electric)	Incremental Cost	\$26.00	\$26.00	\$26.00	\$26.00	\$26.00	\$26.00
Income Qualified Weatherization	Bathroom Aerator 1.0 gpm - Elec DHW	Participation	112	118	124	131	138	145
Income Qualified Weatherization	Bathroom Aerator 1.0 gpm - Elec DHW	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Bathroom Aerator 1.0 gpm - Elec DHW	Total Gross Incremental Savings (kwh)	1,344	1,416	1,488	1,572	1,656	1,740
Income Qualified Weatherization	Bathroom Aerator 1.0 gpm - Elec DHW	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Bathroom Aerator 1.0 gpm - Elec DHW	Incremental Cost	\$0.52	\$0.52	\$0.52	\$0.52	\$0.52	\$0.52
Income Qualified Weatherization	9W LED	Participation	4,021	4,223	4,435	4,657	4,890	5,135
Income Qualified Weatherization	9W LED	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	9W LED	Total Gross Incremental Savings (kwh)	128,672	135,136	141,920	149,024	156,480	164,320
Income Qualified Weatherization	9W LED	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	9W LED	Incremental Cost	\$3.21	\$3.21	\$3.21	\$3.21	\$3.21	\$3.21
Income Qualified Weatherization	LED 5W Globe	Participation	274	288	303	319	335	352

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	LED 5W Globe	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	LED 5W Globe	Total Gross Incremental Savings (kwh)	2,740	2,880	3,030	3,190	3,350	3,520
Income Qualified Weatherization	LED 5W Globe	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	LED 5W Globe	Incremental Cost	\$8.75	\$8.75	\$8.75	\$8.75	\$8.75	\$8.75
Income Qualified Weatherization	LED R30 Dimmable	Participation	803	844	887	932	979	1,028
Income Qualified Weatherization	LED R30 Dimmable	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	LED R30 Dimmable	Total Gross Incremental Savings (kwh)	42,559	44,732	47,011	49,396	51,887	54,484
Income Qualified Weatherization	LED R30 Dimmable	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	LED R30 Dimmable	Incremental Cost	\$11.54	\$11.54	\$11.54	\$11.54	\$11.54	\$11.54
Income Qualified Weatherization	Exterior LED Lamps	Participation	157	165	174	183	193	203
Income Qualified Weatherization	Exterior LED Lamps	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Exterior LED Lamps	Total Gross Incremental Savings (kwh)	14,444	15,180	16,008	16,836	17,756	18,676
Income Qualified Weatherization	Exterior LED Lamps	NTG	1.00	1.00	1.00	1.00	1.00	1.00

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Exterior LED Lamps	Incremental Cost	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20	\$7.20
Income Qualified Weatherization	Filter Whistle	Participation	105	111	117	123	130	137
Income Qualified Weatherization	Filter Whistle	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Filter Whistle	Total Gross Incremental Savings (kwh)	5,775	6,105	6,435	6,765	7,150	7,535
Income Qualified Weatherization	Filter Whistle	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Filter Whistle	Incremental Cost	\$1.64	\$1.64	\$1.64	\$1.64	\$1.64	\$1.64
Income Qualified Weatherization	Kitchen Flip Aerator 1.5 gpm - Elec DHW	Participation	38	40	42	45	48	51
Income Qualified Weatherization	Kitchen Flip Aerator 1.5 gpm - Elec DHW	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Kitchen Flip Aerator 1.5 gpm - Elec DHW	Total Gross Incremental Savings (kwh)	4,560	4,800	5,040	5,400	5,760	6,120
Income Qualified Weatherization	Kitchen Flip Aerator 1.5 gpm - Elec DHW	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Kitchen Flip Aerator 1.5 gpm - Elec DHW	Incremental Cost	\$1.34	\$1.34	\$1.34	\$1.34	\$1.34	\$1.34
Income Qualified Weatherization	LED Nightlight	Participation	490	515	541	569	598	628
Income Qualified Weatherization	LED Nightlight	Total Incentive Budget	-	-	-	-	-	-

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	LED Nightlight	Total Gross Incremental Savings (kwh)	6,860	7,210	7,574	7,966	8,372	8,792
Income Qualified Weatherization	LED Nightlight	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	LED Nightlight	Incremental Cost	\$2.75	\$2.75	\$2.75	\$2.75	\$2.75	\$2.75
Income Qualified Weatherization	Low Flow Showerhead 1.5 gpm - Elec DHW	Participation	89	94	99	104	110	116
Income Qualified Weatherization	Low Flow Showerhead 1.5 gpm - Elec DHW	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Low Flow Showerhead 1.5 gpm - Elec DHW	Total Gross Incremental Savings (kwh)	26,700	28,200	29,700	31,200	33,000	34,800
Income Qualified Weatherization	Low Flow Showerhead 1.5 gpm - Elec DHW	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Low Flow Showerhead 1.5 gpm - Elec DHW	Incremental Cost	\$3.32	\$3.32	\$3.32	\$3.32	\$3.32	\$3.32
Income Qualified Weatherization	Pipe Wrap - Elec DHW (per home)	Participation	23	25	27	29	31	33
Income Qualified Weatherization	Pipe Wrap - Elec DHW (per home)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Pipe Wrap - Elec DHW (per home)	Total Gross Incremental Savings (kwh)	3,404	3,700	3,996	4,292	4,588	4,884
Income Qualified Weatherization	Pipe Wrap - Elec DHW (per home)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Pipe Wrap - Elec DHW (per home)	Incremental Cost	\$1.72	\$1.72	\$1.72	\$1.72	\$1.72	\$1.72

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Refrigerator Replacement	Participation	35	37	39	41	44	47
Income Qualified Weatherization	Refrigerator Replacement	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Refrigerator Replacement	Total Gross Incremental Savings (kwh)	15,470	16,354	17,238	18,122	19,448	20,774
Income Qualified Weatherization	Refrigerator Replacement	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Refrigerator Replacement	Incremental Cost	\$580.00	\$580.00	\$580.00	\$580.00	\$580.00	\$580.00
Income Qualified Weatherization	Smart Thermostat (Electric)	Participation	26	28	30	32	34	36
Income Qualified Weatherization	Smart Thermostat (Electric)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Smart Thermostat (Electric)	Total Gross Incremental Savings (kwh)	9,620	10,360	11,100	11,840	12,580	13,320
Income Qualified Weatherization	Smart Thermostat (Electric)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Smart Thermostat (Electric)	Incremental Cost	\$77.00	\$77.00	\$77.00	\$77.00	\$77.00	\$77.00
Income Qualified Weatherization	Water Heater Temperature Setback - Elec DHW	Participation	75	79	83	88	93	98
Income Qualified Weatherization	Water Heater Temperature Setback - Elec DHW	Total Incentive Budget	-	-	-	-	-	-

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Program	Measure	Description	2019	2021	2022	2023	2024	2025
Income Qualified Weatherization	Water Heater Temperature Setback - Elec DHW	Total Gross Incremental Savings (kwh)	6,450	6,794	7,138	7,568	7,998	8,428
Income Qualified Weatherization	Water Heater Temperature Setback - Elec DHW	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Water Heater Temperature Setback - Elec DHW	Incremental Cost	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50
Income Qualified Weatherization	Duct Sealing Gas Heating with A/C	Participation	316	332	349	367	386	406
Income Qualified Weatherization	Duct Sealing Gas Heating with A/C	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Duct Sealing Gas Heating with A/C	Total Gross Incremental Savings (kwh)	72,364	76,028	79,921	84,043	88,394	92,974
Income Qualified Weatherization	Duct Sealing Gas Heating with A/C	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Duct Sealing Gas Heating with A/C	Incremental Cost	\$225.00	\$225.00	\$225.00	\$225.00	\$225.00	\$225.00
Income Qualified Weatherization	Duct Sealing Electric Heat Pump	Participation	37	39	41	44	47	50
Income Qualified Weatherization	Duct Sealing Electric Heat Pump	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Duct Sealing Electric Heat Pump	Total Gross Incremental Savings (kwh)	30,673	32,331	33,989	36,476	38,963	41,450
Income Qualified Weatherization	Duct Sealing Electric Heat Pump	NTG	1.00	1.00	1.00	1.00	1.00	1.00

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Duct Sealing Electric Heat Pump	Incremental Cost	\$450.00	\$450.00	\$450.00	\$450.00	\$450.00	\$450.00
Income Qualified Weatherization	Duct Sealing Electric Resistive Furnace	Participation	45	48	51	54	57	60
Income Qualified Weatherization	Duct Sealing Electric Resistive Furnace	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Duct Sealing Electric Resistive Furnace	Total Gross Incremental Savings (kwh)	60,840	64,896	68,952	73,008	77,064	81,120
Income Qualified Weatherization	Duct Sealing Electric Resistive Furnace	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Duct Sealing Electric Resistive Furnace	Incremental Cost	\$450.00	\$450.00	\$450.00	\$450.00	\$450.00	\$450.00
Income Qualified Weatherization	Air Sealing Gas Furnace w/ CAC	Participation	465	489	514	540	567	596
Income Qualified Weatherization	Air Sealing Gas Furnace w/ CAC	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Air Sealing Gas Furnace w/ CAC	Total Gross Incremental Savings (kwh)	65,100	68,460	71,960	75,600	79,380	83,440
Income Qualified Weatherization	Air Sealing Gas Furnace w/ CAC	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Air Sealing Gas Furnace w/ CAC	Incremental Cost	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00
Income Qualified Weatherization	Air Sealing Heat Pump	Participation	48	51	54	57	60	63
Income Qualified Weatherization	Air Sealing Heat Pump	Total Incentive Budget	-	-	-	-	-	-

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Air Sealing Heat Pump	Total Gross Incremental Savings (kwh)	72,048	76,551	81,054	85,557	90,060	94,563
Income Qualified Weatherization	Air Sealing Heat Pump	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Air Sealing Heat Pump	Incremental Cost	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00
Income Qualified Weatherization	Air Sealing Electric Furnace w/ CAC	Participation	32	34	36	38	40	42
Income Qualified Weatherization	Air Sealing Electric Furnace w/ CAC	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Air Sealing Electric Furnace w/ CAC	Total Gross Incremental Savings (kwh)	150,016	159,392	168,768	178,144	187,520	196,896
Income Qualified Weatherization	Air Sealing Electric Furnace w/ CAC	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Air Sealing Electric Furnace w/ CAC	Incremental Cost	-	-	-	-	-	-
Income Qualified Weatherization	Air Source Heat Pump 16 SEER	Participation	2	3	4	5	6	7
Income Qualified Weatherization	Air Source Heat Pump 16 SEER	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Air Source Heat Pump 16 SEER	Total Gross Incremental Savings (kwh)	1,582	2,373	3,164	3,955	4,746	5,537
Income Qualified Weatherization	Air Source Heat Pump 16 SEER	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Air Source Heat Pump 16 SEER	Incremental Cost	\$5,400.00	\$5,400.00	\$5,400.00	\$5,400.00	\$5,400.00	\$5,400.00

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Central Air Conditioner 16 SEER	Participation	19	20	21	23	25	27
Income Qualified Weatherization	Central Air Conditioner 16 SEER	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Central Air Conditioner 16 SEER	Total Gross Incremental Savings (kwh)	5,700	6,000	6,300	6,900	7,500	8,100
Income Qualified Weatherization	Central Air Conditioner 16 SEER	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Central Air Conditioner 16 SEER	Incremental Cost	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00
Income Qualified Weatherization	Wall Insulation - Dual (gas heated)	Participation	19	21	23	25	27	29
Income Qualified Weatherization	Wall Insulation - Dual (gas heated)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Wall Insulation - Dual (gas heated)	Total Gross Incremental Savings (kwh)	1,141	1,239	1,357	1,475	1,593	1,711
Income Qualified Weatherization	Wall Insulation - Dual (gas heated)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Wall Insulation - Dual (gas heated)	Incremental Cost	\$877.00	\$877.00	\$877.00	\$877.00	\$877.00	\$877.00
Income Qualified Weatherization	Water Heater Temperature Setback - Gas DHW	Participation	55	58	61	65	69	73
Income Qualified Weatherization	Water Heater Temperature Setback - Gas DHW	Total Incentive Budget	-	-	-	-	-	-

Program	Measure	Description	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Water Heater Temperature Setback - Gas DHW	Total Gross Incremental Savings (kwh)	(1,870)	(1,972)	(2,074)	(2,210)	(2,346)	(2,482)
Income Qualified Weatherization	Water Heater Temperature Setback - Gas DHW	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Water Heater Temperature Setback - Gas DHW	Incremental Cost	-	-	-	-	-	-
Income Qualified Weatherization	Mobile Home Audit (Dual)	Participation	173	181	190	199	208	218
Income Qualified Weatherization	Mobile Home Audit (Dual)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Mobile Home Audit (Dual)	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-
Income Qualified Weatherization	Mobile Home Audit (Dual)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Income Qualified Weatherization	Mobile Home Audit (Dual)	Incremental Cost	\$26.00	\$26.00	\$26.00	\$26.00	\$26.00	\$26.00
Income Qualified Weatherization	Mobile Home Audit (Electric)	Participation	26	28	30	32	34	36
Income Qualified Weatherization	Mobile Home Audit (Electric)	Total Incentive Budget	-	-	-	-	-	-
Income Qualified Weatherization	Mobile Home Audit (Electric)	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-
Income Qualified Weatherization	Mobile Home Audit (Electric)	NTG	1.00	1.00	1.00	1.00	1.00	1.00

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Program	Measure	Description	2019	2020	2021	2022	2023	2024	2025
Income Qualified Weatherization	Mobile Home Audit (Electric)	Incremental Cost	\$106.00	\$106.00	\$106.00	\$106.00	\$106.00	\$106.00	\$106.00
Energy Efficient Schools	15W LED	Participation	2,600	2,600	-	-	-	-	-
Energy Efficient Schools	15W LED	Total Incentive Budget	-	-	-	-	-	-	-
Energy Efficient Schools	15W LED	Total Gross Incremental Savings (kwh)	124,800	124,800	-	-	-	-	-
Energy Efficient Schools	15W LED	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	15W LED	Incremental Cost	-	-	-	-	-	-	-
Energy Efficient Schools	11W LED	Participation	5,200	5,200	-	-	-	-	-
Energy Efficient Schools	11W LED	Total Incentive Budget	-	-	-	-	-	-	-
Energy Efficient Schools	11W LED	Total Gross Incremental Savings (kwh)	353,600	353,600	-	-	-	-	-
Energy Efficient Schools	11W LED	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	11W LED	Incremental Cost	-	-	-	-	-	-	-
Energy Efficient Schools	Showerheads	Participation	2,600	2,600	2,600	2,600	2,600	2,600	2,600
Energy Efficient Schools	Showerheads	Total Incentive Budget	-	-	-	-	-	-	-

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Energy Efficient Schools	Showerheads	Total Gross Incremental Savings (kwh)	340,600	340,600	340,600	340,600	340,600	340,600
Energy Efficient Schools	Showerheads	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	Showerheads	Incremental Cost	-	-	-	-	-	-
Energy Efficient Schools	Kitchen Aerators	Participation	2,600	2,600	2,600	2,600	2,600	2,600
Energy Efficient Schools	Kitchen Aerators	Total Incentive Budget	-	-	-	-	-	-
Energy Efficient Schools	Kitchen Aerators	Total Gross Incremental Savings (kwh)	145,600	145,600	145,600	145,600	145,600	145,600
Energy Efficient Schools	Kitchen Aerators	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	Kitchen Aerators	Incremental Cost	-	-	-	-	-	-
Energy Efficient Schools	Bathroom Aerators	Participation	5,200	5,200	5,200	5,200	5,200	5,200
Energy Efficient Schools	Bathroom Aerators	Total Incentive Budget	-	-	-	-	-	-
Energy Efficient Schools	Bathroom Aerators	Total Gross Incremental Savings (kwh)	114,400	114,400	114,400	114,400	114,400	114,400
Energy Efficient Schools	Bathroom Aerators	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	Bathroom Aerators	Incremental Cost	-	-	-	-	-	-

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Program	Reference	Description	2020	2021	2022	2023	2024	2025
Energy Efficient Schools	Filter Whistle	Participation	2,600	2,600	2,600	2,600	2,600	2,600
Energy Efficient Schools	Filter Whistle	Total Incentive Budget	-	-	-	-	-	-
Energy Efficient Schools	Filter Whistle	Total Gross Incremental Savings (kwh)	52,000	52,000	52,000	52,000	52,000	52,000
Energy Efficient Schools	Filter Whistle	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	Filter Whistle	Incremental Cost	-	-	-	-	-	-
Energy Efficient Schools	LED Night Light	Participation	2,600	2,600	2,600	2,600	2,600	2,600
Energy Efficient Schools	LED Night Light	Total Incentive Budget	-	-	-	-	-	-
Energy Efficient Schools	LED Night Light	Total Gross Incremental Savings (kwh)	18,200	18,200	18,200	18,200	18,200	18,200
Energy Efficient Schools	LED Night Light	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Energy Efficient Schools	LED Night Light	Incremental Cost	-	-	-	-	-	-
Residential Behavior Savings	Residential Behavior	Participation	35,298	35,298	35,298	35,298	35,298	35,298
Residential Behavior Savings	Residential Behavior	Total Incentive Budget	-	-	-	-	-	-
Residential Behavior Savings	Residential Behavior	Total Gross Incremental Savings (kwh)	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000

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Program	Measure	Description	2019	2020	2022	2023	2024	2025
Residential Behavior Savings	Residential Behavior	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Residential Behavior Savings	Residential Behavior	Incremental Cost	-	-	-	-	-	-
Residential Behavior Savings	Low Income Refill Electric	Participation	13,702	13,702	13,702	13,702	13,702	13,702
Residential Behavior Savings	Low Income Refill Electric	Total Incentive Budget	-	-	-	-	-	-
Residential Behavior Savings	Low Income Refill Electric	Total Gross Incremental Savings (kwh)	1,449,208	1,449,208	1,449,208	1,449,208	1,449,208	1,449,208
Residential Behavior Savings	Low Income Refill Electric	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Residential Behavior Savings	Low Income Refill Electric	Incremental Cost	-	-	-	-	-	-
Appliance Recycling	Refrigerator Recycling	Participation	1,028	1,142	1,206	1,206	1,142	1,028
Appliance Recycling	Refrigerator Recycling	Total Incentive Budget	\$51,400	\$57,100	\$60,300	\$60,300	\$57,100	\$51,400
Appliance Recycling	Refrigerator Recycling	Total Gross Incremental Savings (kwh)	1,013,608	1,126,012	1,189,116	1,189,116	1,126,012	1,013,608
Appliance Recycling	Refrigerator Recycling	NTG	0.71	0.71	0.71	0.71	0.71	0.71
Appliance Recycling	Refrigerator Recycling	Incremental Cost	-	-	-	-	-	-
Appliance Recycling	Freezer Recycling	Participation	161	179	189	189	179	161

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Appliance Recycling	Freezer Recycling	Total Incentive Budget	\$8,050	\$8,950	\$9,450	\$9,450	\$8,950	\$8,050
Appliance Recycling	Freezer Recycling	Total Gross Incremental Savings (kwh)	132,020	146,780	154,980	154,980	146,780	132,020
Appliance Recycling	Freezer Recycling	NTG	0.71	0.71	0.71	0.71	0.71	0.71
Appliance Recycling	Freezer Recycling	Incremental Cost	-	-	-	-	-	-
Appliance Recycling	Room Air Conditioner Recycling	Participation	62	23	30	40	51	64
Appliance Recycling	Room Air Conditioner Recycling	Total Incentive Budget	\$1,550	\$575	\$750	\$1,000	\$1,275	\$1,600
Appliance Recycling	Room Air Conditioner Recycling	Total Gross Incremental Savings (kwh)	34,183	12,681	16,540	22,053	28,118	35,285
Appliance Recycling	Room Air Conditioner Recycling	NTG	0.57	0.57	0.57	0.57	0.57	0.57
Appliance Recycling	Room Air Conditioner Recycling	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Audit Education - All sites	Participation	300	350	420	504	504	504
Home Energy Assessment	Audit Education - All sites	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Audit Education - All sites	Total Gross Incremental Savings (kwh)	18,364	21,424	25,709	30,851	30,851	30,851
Home Energy Assessment	Audit Education - All sites	NTG	1.00	1.00	1.00	1.00	1.00	1.00

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Home Energy Assessment	Audit Education - All sites	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	LED 5W Globe	Participation	600	700	840	1,008	1,008	806
Home Energy Assessment	LED 5W Globe	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	LED 5W Globe	Total Gross Incremental Savings (kwh)	6,221	7,258	8,710	10,452	10,452	8,361
Home Energy Assessment	LED 5W Globe	NTG	0.96	0.96	0.96	0.96	0.96	0.96
Home Energy Assessment	LED 5W Globe	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	LED 9W Bulb	Participation	3,000	3,500	4,200	5,040	4,032	3,024
Home Energy Assessment	LED 9W Bulb	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	LED 9W Bulb	Total Gross Incremental Savings (kwh)	94,680	110,460	132,552	159,062	127,250	95,437
Home Energy Assessment	LED 9W Bulb	NTG	0.96	0.96	0.96	0.96	0.96	0.96
Home Energy Assessment	LED 9W Bulb	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	LED R30 Dimmable	Participation	900	1,050	1,260	1,512	1,512	1,210
Home Energy Assessment	LED R30 Dimmable	Total Incentive Budget	-	-	-	-	-	-

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Home Energy Assessment	LED R30 Dimmable	Total Gross Incremental Savings (kwh)	47,679	55,626	66,751	80,101	80,101	64,081
Home Energy Assessment	LED R30 Dimmable	NTG	0.96	0.96	0.96	0.96	0.96	0.96
Home Energy Assessment	LED R30 Dimmable	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	LED Night Light	Participation	300	350	420	504	504	504
Home Energy Assessment	LED Night Light	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	LED Night Light	Total Gross Incremental Savings (kwh)	4,091	4,773	5,727	6,873	6,873	6,873
Home Energy Assessment	LED Night Light	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Home Energy Assessment	LED Night Light	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Bathroom Aerator	Participation	600	700	840	1,008	1,008	1,008
Home Energy Assessment	Bathroom Aerator	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Bathroom Aerator	Total Gross Incremental Savings (kwh)	5,400	6,300	7,560	9,072	9,072	9,072
Home Energy Assessment	Bathroom Aerator	NTG	1.06	1.06	1.06	1.06	1.06	1.06
Home Energy Assessment	Bathroom Aerator	Incremental Cost	-	-	-	-	-	-

Program	Mission	Description	2019	2020	2021	2022	2023	2024
Home Energy Assessment	Kitchen Aerator	Participation	300	350	420	504	504	504
Home Energy Assessment	Kitchen Aerator	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Kitchen Aerator	Total Gross Incremental Savings (kwh)	34,350	40,075	48,090	57,708	57,708	57,708
Home Energy Assessment	Kitchen Aerator	NTG	1.06	1.06	1.06	1.06	1.06	1.06
Home Energy Assessment	Kitchen Aerator	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Efficient Showerhead	Participation	300	350	420	504	504	504
Home Energy Assessment	Efficient Showerhead	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Efficient Showerhead	Total Gross Incremental Savings (kwh)	61,707	71,992	86,390	103,668	103,668	103,668
Home Energy Assessment	Efficient Showerhead	NTG	1.06	1.06	1.06	1.06	1.06	1.06
Home Energy Assessment	Efficient Showerhead	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Filter Whistle	Participation	300	350	420	504	504	504
Home Energy Assessment	Filter Whistle	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Filter Whistle	Total Gross Incremental Savings (kwh)	18,267	21,312	25,574	30,689	30,689	30,689

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Program	Measure	Description	2019	2020	2021	2022	2023	2024
Home Energy Assessment	Filter Whistle	NTG	1.15	1.15	1.15	1.15	1.15	1.15
Home Energy Assessment	Filter Whistle	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Pipe Wrap (Electric) (per home)	Participation	300	350	420	504	504	504
Home Energy Assessment	Pipe Wrap (Electric) (per home)	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Pipe Wrap (Electric) (per home)	Total Gross Incremental Savings (kwh)	19,620	22,890	27,468	32,962	32,962	32,962
Home Energy Assessment	Pipe Wrap (Electric) (per home)	NTG	1.09	1.09	1.09	1.09	1.09	1.09
Home Energy Assessment	Pipe Wrap (Electric) (per home)	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Water Heater Temperature Setback	Participation	300	350	420	504	504	504
Home Energy Assessment	Water Heater Temperature Setback	Total Incentive Budget	-	-	-	-	-	-
Home Energy Assessment	Water Heater Temperature Setback	Total Gross Incremental Savings (kwh)	25,957	30,283	36,340	43,608	43,608	43,608
Home Energy Assessment	Water Heater Temperature Setback	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Home Energy Assessment	Water Heater Temperature Setback	Incremental Cost	-	-	-	-	-	-
Home Energy Assessment	Wi-Fi Thermostat (Dual Fuel)	Participation	300	350	420	504	504	504

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Program	Equipment	Measure	2019	2020	2021	2022	2023	2024	2025
Home Energy Assessment	Wi-Fi Thermostat (Dual Fuel)	Total Incentive Budget	-	-	-	-	-	-	-
Home Energy Assessment	Wi-Fi Thermostat (Dual Fuel)	Total Gross Incremental Savings (kwh)	59,400	69,300	83,160	99,792	99,792	99,792	99,792
Home Energy Assessment	Wi-Fi Thermostat (Dual Fuel)	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Home Energy Assessment	Wi-Fi Thermostat (Dual Fuel)	Incremental Cost	-	-	-	-	-	-	-
Home Energy Assessment	Wi-Fi Thermostat (Electric)	Participation	300	350	420	504	504	504	504
Home Energy Assessment	Wi-Fi Thermostat (Electric)	Total Incentive Budget	-	-	-	-	-	-	-
Home Energy Assessment	Wi-Fi Thermostat (Electric)	Total Gross Incremental Savings (kwh)	123,657	144,267	173,120	207,744	207,744	207,744	207,744
Home Energy Assessment	Wi-Fi Thermostat (Electric)	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Home Energy Assessment	Wi-Fi Thermostat (Electric)	Incremental Cost	-	-	-	-	-	-	-
Home Energy Assessment	Showerstart Device (TSV Valve)	Participation	-	-	-	-	-	-	-
Home Energy Assessment	Showerstart Device (TSV Valve)	Total Incentive Budget	-	-	-	-	-	-	-
Home Energy Assessment	Showerstart Device (TSV Valve)	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-	-
Home Energy Assessment	Showerstart Device (TSV Valve)	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Program	Measure	Description	2019	2020	2021	2022	2023	2024	2025
Home Energy Assessment	Showerstart Device (TSV Valve)	Incremental Cost	-	-	-	-	-	-	-
Home Energy Assessment	Tier 1 Advanced Power Strip	Participation	300	350	420	504	504	504	504
Home Energy Assessment	Tier 1 Advanced Power Strip	Total Incentive Budget	-	-	-	-	-	-	-
Home Energy Assessment	Tier 1 Advanced Power Strip	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-	-
Home Energy Assessment	Tier 1 Advanced Power Strip	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Home Energy Assessment	Tier 1 Advanced Power Strip	Incremental Cost	-	-	-	-	-	-	-
Food Bank	9W LED	Participation	-	25,248	-	-	-	-	-
Food Bank	9W LED	Total Incentive Budget	-	-	-	-	-	-	-
Food Bank	9W LED	Total Gross Incremental Savings (kwh)	-	747,979	-	-	-	-	-
Food Bank	9W LED	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Food Bank	9W LED	Incremental Cost	-	-	-	-	-	-	-
Food Bank	LED R30 Dimmable	Participation	-	3,156	3,156	-	-	-	-
Food Bank	LED R30 Dimmable	Total Incentive Budget	-	-	-	-	-	-	-

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Food Bank	LED R30 Dimmable	Total Gross Incremental Savings (kwh)	-	167,195	167,195	-	-	-
Food Bank	LED R30 Dimmable	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Food Bank	LED R30 Dimmable	Incremental Cost	-	-	-	-	-	-
Food Bank	Low Flow Showerhead 1.5 gpm - Elec DHW	Participation	-	3,156	3,156	3,156	3,156	3,156
Food Bank	Low Flow Showerhead 1.5 gpm - Elec DHW	Total Incentive Budget	-	-	-	-	-	-
Food Bank	Low Flow Showerhead 1.5 gpm - Elec DHW	Total Gross Incremental Savings (kwh)	-	649,158	649,158	649,158	649,158	649,158
Food Bank	Low Flow Showerhead 1.5 gpm - Elec DHW	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Food Bank	Low Flow Showerhead 1.5 gpm - Elec DHW	Incremental Cost	-	-	-	-	-	-
Bring Your Own Thermostat	BYOT (Bring Your Own Device)	Participation	300	300	300	300	300	300
Bring Your Own Thermostat	BYOT (Bring Your Own Device)	Total Incentive Budget	-	-	-	-	-	-
Bring Your Own Thermostat	BYOT (Bring Your Own Device)	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-
Bring Your Own Thermostat	BYOT (Bring Your Own Device)	NTG	1.00	1.00	1.00	1.00	1.00	1.00
Bring Your Own Thermostat	BYOT (Bring Your Own Device)	Incremental Cost	-	-	-	-	-	-

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Smart Cycle	Smart Cycle (DLC Change Out)	Participation	1,000	1,000	1,000	1,000	1,000	1,000
Smart Cycle	Smart Cycle (DLC Change Out)	Total Incentive Budget	\$96,000	\$116,000	\$136,000	\$156,000	\$176,000	\$196,000
Smart Cycle	Smart Cycle (DLC Change Out)	Total Gross Incremental Savings (kwh)	-	198,000	198,000	198,000	198,000	198,000
Smart Cycle	Smart Cycle (DLC Change Out)	NTG	-	1.00	1.00	1.00	1.00	1.00
Smart Cycle	Smart Cycle (DLC Change Out)	Incremental Cost	-	-	-	-	-	-
C&I Prescriptive	Smart Thermostats	Participation	72	91	118	148	177	205
C&I Prescriptive	Smart Thermostats	Total Incentive Budget	\$1,080	\$1,365	\$1,770	\$2,220	\$2,655	\$3,075
C&I Prescriptive	Smart Thermostats	Total Gross Incremental Savings (kwh)	34,137	43,298	56,214	70,552	84,379	97,979
C&I Prescriptive	Smart Thermostats	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Smart Thermostats	Incremental Cost	\$39.16	\$39.16	\$39.16	\$39.16	\$39.16	\$39.16
C&I Prescriptive	Refrigerator Strip Curtains	Participation	18	42	77	122	178	247
C&I Prescriptive	Refrigerator Strip Curtains	Total Incentive Budget	\$54	\$126	\$231	\$366	\$534	\$741
C&I Prescriptive	Refrigerator Strip Curtains	Total Gross Incremental Savings (kwh)	4,198	9,796	17,958	28,454	41,514	57,607

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C&I Prescriptive	Refrigerator Strip Curtains	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Refrigerator Strip Curtains	Incremental Cost	\$7.50	\$7.50	\$7.50	\$7.50	\$7.50	\$7.50
C&I Prescriptive	Agriculture - Livestock Waterer	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - Livestock Waterer	Total Incentive Budget	\$33	\$33	\$33	\$33	\$33	\$33
C&I Prescriptive	Agriculture - Livestock Waterer	Total Gross Incremental Savings (kwh)	266	266	266	266	266	266
C&I Prescriptive	Agriculture - Livestock Waterer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - Livestock Waterer	Incremental Cost	\$787.50	\$787.50	\$787.50	\$787.50	\$787.50	\$787.50
C&I Prescriptive	Agriculture - Poultry Farm Led Lighting	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - Poultry Farm Led Lighting	Total Incentive Budget	\$0	\$0	\$0	\$0	\$0	\$0
C&I Prescriptive	Agriculture - Poultry Farm Led Lighting	Total Gross Incremental Savings (kwh)	292	292	292	292	292	292
C&I Prescriptive	Agriculture - Poultry Farm Led Lighting	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - Poultry Farm Led Lighting	Incremental Cost	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
C&I Prescriptive	Agriculture - VSD Milk Pump	Participation	1	1	1	1	1	1

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Agriculture - VSD Milk Pump	Total Incentive Budget	\$13	\$13	\$13	\$13	\$13	\$13
C&I Prescriptive	Agriculture - VSD Milk Pump	Total Gross Incremental Savings (kwh)	34	34	34	34	34	34
C&I Prescriptive	Agriculture - VSD Milk Pump	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - VSD Milk Pump	Incremental Cost	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00	\$4,000.00
C&I Prescriptive	Agriculture - High Volume Low Speed Fans	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - High Volume Low Speed Fans	Total Incentive Budget	\$250	\$250	\$250	\$250	\$250	\$250
C&I Prescriptive	Agriculture - High Volume Low Speed Fans	Total Gross Incremental Savings (kwh)	8,543	8,543	8,543	8,543	8,543	8,543
C&I Prescriptive	Agriculture - High Volume Low Speed Fans	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - High Volume Low Speed Fans	Incremental Cost	\$4,180.00	\$4,180.00	\$4,180.00	\$4,180.00	\$4,180.00	\$4,180.00
C&I Prescriptive	Agriculture - High Speed Fans	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - High Speed Fans	Total Incentive Budget	\$250	\$250	\$250	\$250	\$250	\$250
C&I Prescriptive	Agriculture - High Speed Fans	Total Gross Incremental Savings (kwh)	625	625	625	625	625	625
C&I Prescriptive	Agriculture - High Speed Fans	NTG	0.80	0.80	0.80	0.80	0.80	0.80

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Program	Measures	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Agriculture - High Speed Fans	Incremental Cost	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00
C&I Prescriptive	Agriculture - Dairy Plate Cooler	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - Dairy Plate Cooler	Total Incentive Budget	\$17	\$17	\$17	\$17	\$17	\$17
C&I Prescriptive	Agriculture - Dairy Plate Cooler	Total Gross Incremental Savings (kwh)	76	76	76	76	76	76
C&I Prescriptive	Agriculture - Dairy Plate Cooler	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - Dairy Plate Cooler	Incremental Cost	\$16.67	\$16.67	\$16.67	\$16.67	\$16.67	\$16.67
C&I Prescriptive	Agriculture - Heat Mat	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - Heat Mat	Total Incentive Budget	\$22	\$22	\$22	\$22	\$22	\$22
C&I Prescriptive	Agriculture - Heat Mat	Total Gross Incremental Savings (kwh)	657	657	657	657	657	657
C&I Prescriptive	Agriculture - Heat Mat	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - Heat Mat	Incremental Cost	\$225.00	\$225.00	\$225.00	\$225.00	\$225.00	\$225.00
C&I Prescriptive	Agriculture - Automatic Milker Take Off	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - Automatic Milker Take Off	Total Incentive Budget	\$2	\$2	\$2	\$2	\$2	\$2

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Agriculture - Automatic Milker Take Off	Total Gross Incremental Savings (kwh)	556	556	556	556	556	556
C&I Prescriptive	Agriculture - Automatic Milker Take Off	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - Automatic Milker Take Off	Incremental Cost	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67
C&I Prescriptive	Agriculture - Heat Reclaimer	Participation	1	1	1	1	1	1
C&I Prescriptive	Agriculture - Heat Reclaimer	Total Incentive Budget	\$2	\$2	\$2	\$2	\$2	\$2
C&I Prescriptive	Agriculture - Heat Reclaimer	Total Gross Incremental Savings (kwh)	153	153	153	153	153	153
C&I Prescriptive	Agriculture - Heat Reclaimer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Agriculture - Heat Reclaimer	Incremental Cost	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67	\$1.67
C&I Prescriptive	Air Compressor	Participation	1	1	1	1	1	1
C&I Prescriptive	Air Compressor	Total Incentive Budget	\$75	\$75	\$75	\$75	\$75	\$75
C&I Prescriptive	Air Compressor	Total Gross Incremental Savings (kwh)	34,068	34,068	34,068	34,068	34,068	34,068
C&I Prescriptive	Air Compressor	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Air Compressor	Incremental Cost	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00

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Program	Measure	Description	2019	2020	2021	2022	2023	2024
C&I Prescriptive	Air Conditioners	Participation	125	125	125	125	125	125
C&I Prescriptive	Air Conditioners	Total Incentive Budget	\$34,278	\$34,278	\$34,278	\$34,278	\$34,278	\$34,278
C&I Prescriptive	Air Conditioners	Total Gross Incremental Savings (kwh)	899,750	899,750	899,750	899,750	899,750	899,750
C&I Prescriptive	Air Conditioners	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Air Conditioners	Incremental Cost	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00
C&I Prescriptive	Anti-Sweat Heater Control	Participation	290	290	290	290	290	290
C&I Prescriptive	Anti-Sweat Heater Control	Total Incentive Budget	\$19,366	\$19,366	\$19,366	\$19,366	\$19,366	\$19,366
C&I Prescriptive	Anti-Sweat Heater Control	Total Gross Incremental Savings (kwh)	263,610	263,610	263,610	263,610	263,610	263,610
C&I Prescriptive	Anti-Sweat Heater Control	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Anti-Sweat Heater Control	Incremental Cost	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00
C&I Prescriptive	Barrel Wrap Insulation	Participation	1	1	1	1	1	1
C&I Prescriptive	Barrel Wrap Insulation	Total Incentive Budget	\$30	\$30	\$30	\$30	\$30	\$30
C&I Prescriptive	Barrel Wrap Insulation	Total Gross Incremental Savings (kwh)	360	360	360	360	360	360

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Program	Measure	Description	2019	2020	2021	2022	2023	2025
C&I Prescriptive	Barrel Wrap Insulation	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Barrel Wrap Insulation	Incremental Cost	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
C&I Prescriptive	Chilled Water Reset Control	Participation	3	3	3	3	3	3
C&I Prescriptive	Chilled Water Reset Control	Total Incentive Budget	\$716	\$716	\$716	\$716	\$716	\$716
C&I Prescriptive	Chilled Water Reset Control	Total Gross Incremental Savings (kwh)	49,608	49,608	49,608	49,608	49,608	49,608
C&I Prescriptive	Chilled Water Reset Control	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Chilled Water Reset Control	Incremental Cost	\$681.34	\$681.34	\$681.34	\$681.34	\$681.34	\$681.34
C&I Prescriptive	Chiller	Participation	72	72	72	72	72	72
C&I Prescriptive	Chiller	Total Incentive Budget	\$367,200	\$367,200	\$367,200	\$367,200	\$367,200	\$367,200
C&I Prescriptive	Chiller	Total Gross Incremental Savings (kwh)	844,776	844,776	844,776	844,776	844,776	844,776
C&I Prescriptive	Chiller	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Chiller	Incremental Cost	\$79.46	\$79.46	\$79.46	\$79.46	\$79.46	\$79.46
C&I Prescriptive	Chiller Tune-Up	Participation	3	3	3	3	3	3

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C&I Prescriptive	Chiller Tune-Up	Total Incentive Budget	\$3,816	\$3,816	\$3,816	\$3,816	\$3,816	\$3,816
C&I Prescriptive	Chiller Tune-Up	Total Gross Incremental Savings (kwh)	29,082	29,082	29,082	29,082	29,082	29,082
C&I Prescriptive	Chiller Tune-Up	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Chiller Tune-Up	Incremental Cost	\$1,272.00	\$1,272.00	\$1,272.00	\$1,272.00	\$1,272.00	\$1,272.00
C&I Prescriptive	Clothes Washer	Participation	3	3	3	3	3	3
C&I Prescriptive	Clothes Washer	Total Incentive Budget	\$180	\$180	\$180	\$180	\$180	\$180
C&I Prescriptive	Clothes Washer	Total Gross Incremental Savings (kwh)	1,626	1,626	1,626	1,626	1,626	1,626
C&I Prescriptive	Clothes Washer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Clothes Washer	Incremental Cost	\$475.33	\$475.33	\$475.33	\$475.33	\$475.33	\$475.33
C&I Prescriptive	Combination Oven	Participation	3	3	3	3	3	3
C&I Prescriptive	Combination Oven	Total Incentive Budget	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
C&I Prescriptive	Combination Oven	Total Gross Incremental Savings (kwh)	55,296	55,296	55,296	55,296	55,296	55,296
C&I Prescriptive	Combination Oven	NTG	0.80	0.80	0.80	0.80	0.80	0.80

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Program	Measure	Incremental Cost	2019	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Combination Oven	Incremental Cost	\$2,125.00	\$2,125.00	\$2,125.00	\$2,125.00	\$2,125.00	\$2,125.00	\$2,125.00
C&I Prescriptive	Compressed Air Nozzles	Participation	2	2	2	2	2	2	2
C&I Prescriptive	Compressed Air Nozzles	Total Incentive Budget	\$13	\$13	\$13	\$13	\$13	\$13	\$13
C&I Prescriptive	Compressed Air Nozzles	Total Gross Incremental Savings (kwh)	1,776	1,776	1,776	1,776	1,776	1,776	1,776
C&I Prescriptive	Compressed Air Nozzles	NTG	0.80	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Compressed Air Nozzles	Incremental Cost	\$14.00	\$14.00	\$14.00	\$14.00	\$14.00	\$14.00	\$14.00
C&I Prescriptive	Convection Oven	Participation	3	3	3	3	3	3	3
C&I Prescriptive	Convection Oven	Total Incentive Budget	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050
C&I Prescriptive	Convection Oven	Total Gross Incremental Savings (kwh)	9,705	9,705	9,705	9,705	9,705	9,705	9,705
C&I Prescriptive	Convection Oven	NTG	0.80	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Convection Oven	Incremental Cost	\$1,113.00	\$1,113.00	\$1,113.00	\$1,113.00	\$1,113.00	\$1,113.00	\$1,113.00
C&I Prescriptive	Commercial Dishwasher	Participation	2	2	2	2	2	2	2
C&I Prescriptive	Commercial Dishwasher	Total Incentive Budget	\$2,325	\$2,325	\$2,325	\$2,325	\$2,325	\$2,325	\$2,325

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Program	Measure	Category	2019	2020	2021	2022	2023	2024
C&I Prescriptive	Commercial Dishwasher	Total Gross Incremental Savings (kwh)	25,714	25,714	25,714	25,714	25,714	25,714
C&I Prescriptive	Commercial Dishwasher	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Commercial Dishwasher	Incremental Cost	\$616.25	\$616.25	\$616.25	\$616.25	\$616.25	\$616.25
C&I Prescriptive	Exterior LED	Participation	1,342	1,342	1,342	1,342	1,342	1,342
C&I Prescriptive	Exterior LED	Total Incentive Budget	\$144,225	\$144,225	\$144,225	\$144,225	\$144,225	\$144,225
C&I Prescriptive	Exterior LED	Total Gross Incremental Savings (kwh)	1,356,762	1,356,762	1,356,762	1,356,762	1,356,762	1,356,762
C&I Prescriptive	Exterior LED	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Exterior LED	Incremental Cost	\$270.24	\$270.24	\$270.24	\$270.24	\$270.24	\$270.24
C&I Prescriptive	Freezer	Participation	79	86	93	99	104	109
C&I Prescriptive	Freezer	Total Incentive Budget	\$15,800	\$17,200	\$18,600	\$19,800	\$20,800	\$21,800
C&I Prescriptive	Freezer	Total Gross Incremental Savings (kwh)	240,950	262,300	283,650	301,950	317,200	332,450
C&I Prescriptive	Freezer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Freezer	Incremental Cost	\$220.25	\$220.25	\$220.25	\$220.25	\$220.25	\$220.25

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Fryer	Participation	1	1	1	1	1	1
C&I Prescriptive	Fryer	Total Incentive Budget	\$80	\$80	\$80	\$80	\$80	\$80
C&I Prescriptive	Fryer	Total Gross Incremental Savings (kwh)	1,526	1,526	1,526	1,526	1,526	1,526
C&I Prescriptive	Fryer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Fryer	Incremental Cost	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00	\$500.00
C&I Prescriptive	Griddle	Participation	3	3	3	3	3	3
C&I Prescriptive	Griddle	Total Incentive Budget	\$1,650	\$1,650	\$1,650	\$1,650	\$1,650	\$1,650
C&I Prescriptive	Griddle	Total Gross Incremental Savings (kwh)	30,099	30,099	30,099	30,099	30,099	30,099
C&I Prescriptive	Griddle	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Griddle	Incremental Cost	\$2,090.00	\$2,090.00	\$2,090.00	\$2,090.00	\$2,090.00	\$2,090.00
C&I Prescriptive	Heat Pump Water Heater	Participation	1	1	1	1	1	1
C&I Prescriptive	Heat Pump Water Heater	Total Incentive Budget	\$500	\$500	\$500	\$500	\$500	\$500
C&I Prescriptive	Heat Pump Water Heater	Total Gross Incremental Savings (kwh)	1,534	1,534	1,534	1,534	1,534	1,534

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Program	Measure	Description	2019	2020	2021	2022	2023	2024
C&I Prescriptive	Heat Pump Water Heater	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Heat Pump Water Heater	Incremental Cost	\$433.00	\$433.00	\$433.00	\$433.00	\$433.00	\$433.00
C&I Prescriptive	Heat Pump	Participation	135	135	135	135	135	135
C&I Prescriptive	Heat Pump	Total Incentive Budget	\$26,758	\$26,758	\$26,758	\$26,758	\$26,758	\$26,758
C&I Prescriptive	Heat Pump	Total Gross Incremental Savings (kwh)	166,320	166,320	166,320	166,320	166,320	166,320
C&I Prescriptive	Heat Pump	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Heat Pump	Incremental Cost	\$143.64	\$143.64	\$143.64	\$143.64	\$143.64	\$143.64
C&I Prescriptive	Hot Food Holding Cabinet	Participation	2	2	2	2	2	2
C&I Prescriptive	Hot Food Holding Cabinet	Total Incentive Budget	\$457	\$457	\$457	\$457	\$457	\$457
C&I Prescriptive	Hot Food Holding Cabinet	Total Gross Incremental Savings (kwh)	6,584	6,584	6,584	6,584	6,584	6,584
C&I Prescriptive	Hot Food Holding Cabinet	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Hot Food Holding Cabinet	Incremental Cost	\$1,110.00	\$1,110.00	\$1,110.00	\$1,110.00	\$1,110.00	\$1,110.00
C&I Prescriptive	Ice Machine	Participation	3	3	3	3	3	3

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Program	Measure	Description	2019	2020	2021	2022	2023	2024
C&I Prescriptive	Ice Machine	Total Incentive Budget	\$510	\$510	\$510	\$510	\$510	\$510
C&I Prescriptive	Ice Machine	Total Gross Incremental Savings (kwh)	2,670	2,670	2,670	2,670	2,670	2,670
C&I Prescriptive	Ice Machine	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Ice Machine	Incremental Cost	\$1,333.60	\$1,333.60	\$1,333.60	\$1,333.60	\$1,333.60	\$1,333.60
C&I Prescriptive	Interior LED - High-Bay (including LED troffer and LED linear tubes)	Participation	1,293	1,475	1,597	1,643	1,627	1,536
C&I Prescriptive	Interior LED - High-Bay (including LED troffer and LED linear tubes)	Total Incentive Budget	\$87,717	\$93,385	\$93,877	\$89,141	\$80,905	\$69,425
C&I Prescriptive	Interior LED - High-Bay (including LED troffer and LED linear tubes)	Total Gross Incremental Savings (kwh)	1,466,262	1,672,650	1,810,998	1,863,162	1,845,018	1,741,824
C&I Prescriptive	Interior LED - High-Bay (including LED troffer and LED linear tubes)	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Interior LED - High-Bay (including LED troffer and LED linear tubes)	Incremental Cost	\$113.54	\$113.54	\$113.54	\$113.54	\$113.54	\$113.54
C&I Prescriptive	Interior LED - Low-Bay (including LED troffer and LED linear tubes)	Participation	37,209	42,854	47,026	49,043	49,258	47,221

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Program	Measure	Calculation	2019	2020	2021	2022	2023	2024
C&I Prescriptive	Interior LED - Low-Bay (including LED troffer and LED linear tubes)	Total Incentive Budget	\$530,228	\$569,907	\$580,659	\$558,915	\$514,512	\$448,319
C&I Prescriptive	Interior LED - Low-Bay (including LED troffer and LED linear tubes)	Total Gross Incremental Savings (kwh)	7,367,382	8,485,092	9,311,148	9,710,514	9,753,084	9,349,758
C&I Prescriptive	Interior LED - Low-Bay (including LED troffer and LED linear tubes)	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Interior LED - Low-Bay (including LED troffer and LED linear tubes)	Incremental Cost	\$78.04	\$78.04	\$78.04	\$78.04	\$78.04	\$78.04
C&I Prescriptive	Lighting Control	Participation	906	906	906	906	906	906
C&I Prescriptive	Lighting Control	Total Incentive Budget	\$16,317	\$16,317	\$16,317	\$16,317	\$16,317	\$16,317
C&I Prescriptive	Lighting Control	Total Gross Incremental Savings (kwh)	557,190	557,190	557,190	557,190	557,190	557,190
C&I Prescriptive	Lighting Control	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Lighting Control	Incremental Cost	\$98.75	\$98.75	\$98.75	\$98.75	\$98.75	\$98.75
C&I Prescriptive	Lighting Power Density Reduction	Participation	10	10	10	10	10	10
C&I Prescriptive	Lighting Power Density Reduction	Total Incentive Budget	\$49,958	\$49,958	\$49,958	\$49,958	\$49,958	\$49,958
C&I Prescriptive	Lighting Power Density Reduction	Total Gross Incremental Savings (kwh)	317,320	317,320	317,320	317,320	317,320	317,320

C&I Prescriptive	Lighting Power Density Reduction	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Lighting Power Density Reduction	Incremental Cost	\$4,995.83	\$4,995.83	\$4,995.83	\$4,995.83	\$4,995.83	\$4,995.83
C&I Prescriptive	Low Flow Pre-Rinse Sprayer	Participation	1	1	1	1	1	1
C&I Prescriptive	Low Flow Pre-Rinse Sprayer	Total Incentive Budget	\$60	\$60	\$60	\$60	\$60	\$60
C&I Prescriptive	Low Flow Pre-Rinse Sprayer	Total Gross Incremental Savings (kwh)	7,130	7,130	7,130	7,130	7,130	7,130
C&I Prescriptive	Low Flow Pre-Rinse Sprayer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Low Flow Pre-Rinse Sprayer	Incremental Cost	\$92.90	\$92.90	\$92.90	\$92.90	\$92.90	\$92.90
C&I Prescriptive	Pellet Dryer Duct Insulation	Participation	1	1	1	1	1	1
C&I Prescriptive	Pellet Dryer Duct Insulation	Total Incentive Budget	\$30	\$30	\$30	\$30	\$30	\$30
C&I Prescriptive	Pellet Dryer Duct Insulation	Total Gross Incremental Savings (kwh)	198	198	198	198	198	198
C&I Prescriptive	Pellet Dryer Duct Insulation	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Pellet Dryer Duct Insulation	Incremental Cost	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
C&I Prescriptive	Programmable Thermostat	Participation	1	1	1	1	1	1

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Program	Measure	Program	2019	2020	2021	2022	2023	2025
C&I Prescriptive	Programmable Thermostat	Total Incentive Budget	\$50	\$50	\$50	\$50	\$50	\$50
C&I Prescriptive	Programmable Thermostat	Total Gross Incremental Savings (kwh)	649	649	649	649	649	649
C&I Prescriptive	Programmable Thermostat	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Programmable Thermostat	Incremental Cost	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00
C&I Prescriptive	Refrigerated Case Cover	Participation	1	1	1	1	1	1
C&I Prescriptive	Refrigerated Case Cover	Total Incentive Budget	\$10	\$10	\$10	\$10	\$10	\$10
C&I Prescriptive	Refrigerated Case Cover	Total Gross Incremental Savings (kwh)	158	158	158	158	158	158
C&I Prescriptive	Refrigerated Case Cover	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Refrigerated Case Cover	Incremental Cost	\$42.00	\$42.00	\$42.00	\$42.00	\$42.00	\$42.00
C&I Prescriptive	Refrigerated LED	Participation	84	111	140	172	204	233
C&I Prescriptive	Refrigerated LED	Total Incentive Budget	\$2,446	\$3,232	\$4,077	\$5,009	\$5,940	\$6,785
C&I Prescriptive	Refrigerated LED	Total Gross Incremental Savings (kwh)	25,536	33,744	42,560	52,288	62,016	70,832
C&I Prescriptive	Refrigerated LED	NTG	0.80	0.80	0.80	0.80	0.80	0.80

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Refrigerated LED	Incremental Cost	\$35.89	\$35.89	\$35.89	\$35.89	\$35.89	\$35.89
C&I Prescriptive	Refrigerator	Participation	7	7	7	7	7	7
C&I Prescriptive	Refrigerator	Total Incentive Budget	\$419	\$419	\$419	\$419	\$419	\$419
C&I Prescriptive	Refrigerator	Total Gross Incremental Savings (kwh)	4,284	4,284	4,284	4,284	4,284	4,284
C&I Prescriptive	Refrigerator	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Refrigerator	Incremental Cost	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00	\$180.00
C&I Prescriptive	Steam Cooker	Participation	1	1	1	1	1	1
C&I Prescriptive	Steam Cooker	Total Incentive Budget	\$200	\$200	\$200	\$200	\$200	\$200
C&I Prescriptive	Steam Cooker	Total Gross Incremental Savings (kwh)	2,210	2,210	2,210	2,210	2,210	2,210
C&I Prescriptive	Steam Cooker	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Steam Cooker	Incremental Cost	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00
C&I Prescriptive	Vending Machine Control	Participation	3	3	3	3	3	3
C&I Prescriptive	Vending Machine Control	Total Incentive Budget	\$125	\$125	\$125	\$125	\$125	\$125

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Project	Measure	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Vending Machine Control	Total Gross Incremental Savings (kwh)	3,162	3,162	3,162	3,162	3,162	3,162
C&I Prescriptive	Vending Machine Control	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Vending Machine Control	Incremental Cost	\$179.67	\$179.67	\$179.67	\$179.67	\$179.67	\$179.67
C&I Prescriptive	VFD-Fan	Participation	2	2	3	4	5	6
C&I Prescriptive	VFD-Fan	Total Incentive Budget	\$1,725	\$1,725	\$2,588	\$3,450	\$4,313	\$5,175
C&I Prescriptive	VFD-Fan	Total Gross Incremental Savings (kwh)	48,644	48,644	72,966	97,288	121,610	145,932
C&I Prescriptive	VFD-Fan	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	VFD-Fan	Incremental Cost	\$3,638.33	\$3,638.33	\$3,638.33	\$3,638.33	\$3,638.33	\$3,638.33
C&I Prescriptive	VFD-Pump	Participation	3	4	5	6	7	9
C&I Prescriptive	VFD-Pump	Total Incentive Budget	\$2,475	\$3,300	\$4,125	\$4,950	\$5,775	\$7,425
C&I Prescriptive	VFD-Pump	Total Gross Incremental Savings (kwh)	164,604	219,472	274,340	329,208	384,076	493,812
C&I Prescriptive	VFD-Pump	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	VFD-Pump	Incremental Cost	\$3,059.00	\$3,059.00	\$3,059.00	\$3,059.00	\$3,059.00	\$3,059.00

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
C&I Prescriptive	Wifi-Enabled Thermostat	Participation	360	360	360	360	360	360
C&I Prescriptive	Wifi-Enabled Thermostat	Total Incentive Budget	\$36,000	\$36,000	\$36,000	\$36,000	\$36,000	\$36,000
C&I Prescriptive	Wifi-Enabled Thermostat	Total Gross Incremental Savings (kwh)	229,320	229,320	229,320	229,320	229,320	229,320
C&I Prescriptive	Wifi-Enabled Thermostat	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Wifi-Enabled Thermostat	Incremental Cost	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00
C&I Prescriptive	Window Air Conditioner & PTAC	Participation	10	13	16	19	22	26
C&I Prescriptive	Window Air Conditioner & PTAC	Total Incentive Budget	\$469	\$609	\$750	\$890	\$1,031	\$1,218
C&I Prescriptive	Window Air Conditioner & PTAC	Total Gross Incremental Savings (kwh)	2,070	2,691	3,312	3,933	4,554	5,382
C&I Prescriptive	Window Air Conditioner & PTAC	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Window Air Conditioner & PTAC	Incremental Cost	\$196.00	\$196.00	\$196.00	\$196.00	\$196.00	\$196.00
C&I Prescriptive	High Efficiency Hand Dryer	Participation	47	63	88	116	144	179
C&I Prescriptive	High Efficiency Hand Dryer	Total Incentive Budget	\$8,460	\$11,340	\$15,840	\$20,880	\$25,920	\$32,220
C&I Prescriptive	High Efficiency Hand Dryer	Total Gross Incremental Savings (kwh)	36,132	48,432	67,651	89,176	110,701	137,608

Program	Measure	Description	2019	2020	2021	2022	2023	2025
C&I Prescriptive	High Efficiency Hand Dryer	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	High Efficiency Hand Dryer	Incremental Cost	\$450.00	\$450.00	\$450.00	\$450.00	\$450.00	\$450.00
C&I Prescriptive	Efficient low-temp compressor	Participation	-	1	2	3	4	6
C&I Prescriptive	Efficient low-temp compressor	Total Incentive Budget	-	\$221	\$442	\$662	\$883	\$1,325
C&I Prescriptive	Efficient low-temp compressor	Total Gross Incremental Savings (kwh)	-	678	1,356	2,033	2,711	4,067
C&I Prescriptive	Efficient low-temp compressor	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Efficient low-temp compressor	Incremental Cost	\$552.00	\$552.00	\$552.00	\$552.00	\$552.00	\$552.00
C&I Prescriptive	Commercial Refrigeration Tune-Up	Participation	319	412	511	613	714	810
C&I Prescriptive	Commercial Refrigeration Tune-Up	Total Incentive Budget	\$9,570	\$12,360	\$15,330	\$18,390	\$21,420	\$24,300
C&I Prescriptive	Commercial Refrigeration Tune-Up	Total Gross Incremental Savings (kwh)	186,731	241,170	299,121	358,828	417,950	474,145
C&I Prescriptive	Commercial Refrigeration Tune-Up	NTG	0.80	0.80	0.80	0.80	0.80	0.80
C&I Prescriptive	Commercial Refrigeration Tune-Up	Incremental Cost	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
C&I Prescriptive	Duct sealing	Participation	-	-	-	-	-	-

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Program	Measure	Description	2019	2020	2021	2022	2023	2024
C&I Prescriptive	Duct sealing	Total Incentive Budget	-	-	-	-	-	-
C&I Prescriptive	Duct sealing	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-
C&I Prescriptive	Duct sealing	NTG	-	-	-	-	-	-
C&I Prescriptive	Duct sealing	Incremental Cost	-	-	-	-	-	-
C&I Custom	C&I Custom	Participation	35	35	35	35	35	35
C&I Custom	C&I Custom	Total Incentive Budget	\$395,191	\$395,191	\$395,191	\$395,191	\$395,191	\$395,191
C&I Custom	C&I Custom	Total Gross Incremental Savings (kwh)	4,453,104	4,453,104	4,453,104	4,453,104	4,453,104	4,453,104
C&I Custom	C&I Custom	NTG	1.00	1.00	1.00	1.00	1.00	1.00
C&I Custom	C&I Custom	Incremental Cost	\$26,185.00	\$26,185.00	\$26,185.00	\$26,185.00	\$26,185.00	\$26,185.00
C&I Custom	C&I Custom Pilot	Participation	161	161	161	161	161	161
C&I Custom	C&I Custom Pilot	Total Incentive Budget	\$96,347	\$96,347	\$96,347	\$96,347	\$96,347	\$96,347
C&I Custom	C&I Custom Pilot	Total Gross Incremental Savings (kwh)	1,654,130	1,654,130	1,654,130	1,654,130	1,654,130	1,654,130
C&I Custom	C&I Custom Pilot	NTG	1.00	1.00	1.00	1.00	1.00	1.00

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Program	Measure	Incremental Cost	2020	2021	2022	2023	2024	2025
C&I Custom	C&I Custom Pilot	Incremental Cost	-	-	-	-	-	-
Small Business	Smart Thermostats	Participation	18	22	29	37	44	51
Small Business	Smart Thermostats	Total Incentive Budget	\$270	\$330	\$435	\$555	\$660	\$765
Small Business	Smart Thermostats	Total Gross Incremental Savings (kwh)	13,257	16,203	21,359	27,251	32,406	37,562
Small Business	Smart Thermostats	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Smart Thermostats	Incremental Cost	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Small Business	Anti-Sweat Heater Control	Participation	6	6	6	6	6	6
Small Business	Anti-Sweat Heater Control	Total Incentive Budget	\$1,020	\$1,020	\$1,020	\$1,020	\$1,020	\$1,020
Small Business	Anti-Sweat Heater Control	Total Gross Incremental Savings (kwh)	5,454	5,454	5,454	5,454	5,454	5,454
Small Business	Anti-Sweat Heater Control	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Anti-Sweat Heater Control	Incremental Cost	\$170.00	\$170.00	\$170.00	\$170.00	\$170.00	\$170.00
Small Business	EC Motors	Participation	-	-	-	-	-	-
Small Business	EC Motors	Total Incentive Budget	-	-	-	-	-	-

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Small Business	EC Motors	Total Gross Incremental Savings (kwh)	-	-	-	-	-	-
Small Business	EC Motors	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	EC Motors	Incremental Cost	\$66.76	\$66.76	\$66.76	\$66.76	\$66.76	\$66.76
Small Business	Exterior LED	Participation	4,263	4,263	4,263	4,263	4,263	4,263
Small Business	Exterior LED	Total Incentive Budget	\$380,302	\$380,302	\$380,302	\$380,302	\$380,302	\$380,302
Small Business	Exterior LED	Total Gross Incremental Savings (kwh)	1,922,613	1,922,613	1,922,613	1,922,613	1,922,613	1,922,613
Small Business	Exterior LED	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Exterior LED	Incremental Cost	\$89.21	\$89.21	\$89.21	\$89.21	\$89.21	\$89.21
Small Business	Faucet Aerator	Participation	3	3	3	3	3	3
Small Business	Faucet Aerator	Total Incentive Budget	\$14	\$14	\$14	\$14	\$14	\$14
Small Business	Faucet Aerator	Total Gross Incremental Savings (kwh)	1,512	1,512	1,512	1,512	1,512	1,512
Small Business	Faucet Aerator	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Faucet Aerator	Incremental Cost	\$4.72	\$4.72	\$4.72	\$4.72	\$4.72	\$4.72

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Program	Measure	Description	2019	2020	2021	2022	2023	2024
Small Business	Interior LED	Participation	3,948	3,948	3,948	3,948	3,948	3,948
Small Business	Interior LED	Total Incentive Budget	\$132,653	\$123,798	\$114,944	\$106,089	\$97,235	\$88,380
Small Business	Interior LED	Total Gross Incremental Savings (kwh)	852,768	852,768	852,768	852,768	852,768	852,768
Small Business	Interior LED	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Interior LED	Incremental Cost	\$33.60	\$33.60	\$33.60	\$33.60	\$33.60	\$33.60
Small Business	Lighting Control	Participation	9	9	9	9	9	9
Small Business	Lighting Control	Total Incentive Budget	\$400	\$400	\$400	\$400	\$400	\$400
Small Business	Lighting Control	Total Gross Incremental Savings (kwh)	2,115	2,115	2,115	2,115	2,115	2,115
Small Business	Lighting Control	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Lighting Control	Incremental Cost	\$44.44	\$44.44	\$44.44	\$44.44	\$44.44	\$44.44
Small Business	Low Flow Pre-Rinse Sprayer	Participation	3	3	3	3	3	3
Small Business	Low Flow Pre-Rinse Sprayer	Total Incentive Budget	\$180	\$180	\$180	\$180	\$180	\$180
Small Business	Low Flow Pre-Rinse Sprayer	Total Gross Incremental Savings (kwh)	21,390	21,390	21,390	21,390	21,390	21,390

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Small Business	Low Flow Pre-Rinse Sprayer	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Low Flow Pre-Rinse Sprayer	Incremental Cost	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00
Small Business	Programmable Thermostat	Participation	70	71	71	67	67	67
Small Business	Programmable Thermostat	Total Incentive Budget	\$14,047	\$14,248	\$14,248	\$13,445	\$13,445	\$13,445
Small Business	Programmable Thermostat	Total Gross Incremental Savings (kwh)	51,590	52,327	52,327	49,379	49,379	49,379
Small Business	Programmable Thermostat	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Programmable Thermostat	Incremental Cost	\$200.67	\$200.67	\$200.67	\$200.67	\$200.67	\$200.67
Small Business	Programmable Thermostat (Gas Heat, Electric Cooling)	Participation	27	27	27	27	27	27
Small Business	Programmable Thermostat (Gas Heat, Electric Cooling)	Total Incentive Budget	\$4,424	\$4,424	\$4,424	\$4,424	\$4,424	\$4,424
Small Business	Programmable Thermostat (Gas Heat, Electric Cooling)	Total Gross Incremental Savings (kwh)	19,899	19,899	19,899	19,899	19,899	19,899
Small Business	Programmable Thermostat (Gas Heat, Electric Cooling)	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Programmable Thermostat (Gas Heat, Electric Cooling)	Incremental Cost	\$163.84	\$163.84	\$163.84	\$163.84	\$163.84	\$163.84

Program	Measure	Measurement	2019	2020	2021	2022	2023	2024
	Heat, Electric Cooling)							
Small Business	Refrigerated Case Cover	Participation	30	30	30	30	30	30
Small Business	Refrigerated Case Cover	Total Incentive Budget	\$285	\$285	\$285	\$285	\$285	\$285
Small Business	Refrigerated Case Cover	Total Gross Incremental Savings (kwh)	1,590	1,590	1,590	1,590	1,590	1,590
Small Business	Refrigerated Case Cover	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Refrigerated Case Cover	Incremental Cost	\$9.50	\$9.50	\$9.50	\$9.50	\$9.50	\$9.50
Small Business	Refrigerated LED	Participation	12	12	12	12	12	12
Small Business	Refrigerated LED	Total Incentive Budget	\$570	\$570	\$570	\$570	\$570	\$570
Small Business	Refrigerated LED	Total Gross Incremental Savings (kwh)	4,908	4,908	4,908	4,908	4,908	4,908
Small Business	Refrigerated LED	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Refrigerated LED	Incremental Cost	\$47.50	\$47.50	\$47.50	\$47.50	\$47.50	\$47.50
Small Business	Vending Machine Control	Participation	6	6	6	6	6	6
Small Business	Vending Machine Control	Total Incentive Budget	\$1,590	\$1,590	\$1,590	\$1,590	\$1,590	\$1,590

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Program	Measure	Category	2020	2021	2022	2023	2024	2025
Small Business	Vending Machine Control	Total Gross Incremental Savings (kwh)	8,460	8,460	8,460	8,460	8,460	8,460
Small Business	Vending Machine Control	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Vending Machine Control	Incremental Cost	\$265.00	\$265.00	\$265.00	\$265.00	\$265.00	\$265.00
Small Business	Wifi-Enabled Thermostat	Participation	6	6	6	6	6	6
Small Business	Wifi-Enabled Thermostat	Total Incentive Budget	\$2,250	\$2,250	\$2,250	\$2,250	\$2,250	\$2,250
Small Business	Wifi-Enabled Thermostat	Total Gross Incremental Savings (kwh)	4,422	4,422	4,422	4,422	4,422	4,422
Small Business	Wifi-Enabled Thermostat	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Wifi-Enabled Thermostat	Incremental Cost	\$375.00	\$375.00	\$375.00	\$375.00	\$375.00	\$375.00
Small Business	Wifi-Enabled Thermostat (Gas Heat, Electric Cooling)	Participation	36	36	36	36	36	36
Small Business	Wifi-Enabled Thermostat (Gas Heat, Electric Cooling)	Total Incentive Budget	\$10,031	\$10,031	\$10,031	\$10,031	\$10,031	\$10,031
Small Business	Wifi-Enabled Thermostat (Gas Heat, Electric Cooling)	Total Gross Incremental Savings (kwh)	26,532	26,532	26,532	26,532	26,532	26,532
Small Business	Wifi-Enabled Thermostat (Gas Heat, Electric Cooling)	NTG	0.91	0.91	0.91	0.91	0.91	0.91

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Program	Measure	Description	2020	2021	2022	2023	2024	2025
Small Business	Wifi-Enabled Thermostat (Gas Heat, Electric Cooling)	Incremental Cost	\$278.65	\$278.65	\$278.65	\$278.65	\$278.65	\$278.65
Small Business	Program the Programmable Thermostat	Participation	3	3	3	3	3	3
Small Business	Program the Programmable Thermostat	Total Incentive Budget	\$75	\$75	\$75	\$75	\$75	\$75
Small Business	Program the Programmable Thermostat	Total Gross Incremental Savings (kwh)	2,211	2,211	2,211	2,211	2,211	2,211
Small Business	Program the Programmable Thermostat	NTG	0.91	0.91	0.91	0.91	0.91	0.91
Small Business	Program the Programmable Thermostat	Incremental Cost	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Small Business	Program the Programmable Thermostat (Gas Heat, Electric Cooling)	Participation	3	3	3	3	3	3
Small Business	Program the Programmable Thermostat (Gas Heat, Electric Cooling)	Total Incentive Budget	\$56	\$56	\$56	\$56	\$56	\$56
Small Business	Program the Programmable Thermostat (Gas Heat, Electric Cooling)	Total Gross Incremental Savings (kwh)	2,211	2,211	2,211	2,211	2,211	2,211
Small Business	Program the Programmable Thermostat (Gas Heat, Electric Cooling)	NTG	0.91	0.91	0.91	0.91	0.91	0.91

Program	Measure	Description	2019	2020	2021	2022	2023	2024	2025
Small Business	Program the Programmable Thermostat (Gas Heat, Electric Cooling)	Incremental Cost	\$18.75	\$18.75	\$18.75	\$18.75	\$18.75	\$18.75	\$18.75
Home Energy Management Systems	Home Energy Management System	Participation	-	1,000	1,000	1,000	1,000	1,000	1,000
Home Energy Management Systems	Home Energy Management System	Total Incentive Budget	-	-	-	-	-	-	-
Home Energy Management Systems	Home Energy Management System	Total Gross Incremental Savings (kwh)	-	515,000	515,000	515,000	515,000	515,000	515,000
Home Energy Management Systems	Home Energy Management System	NTG	-	1.00	1.00	1.00	1.00	1.00	1.00
Home Energy Management Systems	Home Energy Management System	Incremental Cost	-	-	-	-	-	-	-
Residential CVR	Residential CVR	Participation							
Residential CVR	Residential CVR	Total Incentive Budget	-	-	-	-	-	-	-
Residential CVR	Residential CVR	Total Gross Incremental Savings (kwh)	1,461,047	-	-	1,461,047	-	-	
Residential CVR	Residential CVR	NTG	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residential CVR	Residential CVR	Incremental Cost	-	-	-	-	-	-	-



prepared for

VECTREN ENERGY DELIVERY OF INDIANA

*2020-2025 Integrated **Electric** DSM Market Potential Study & Action Plan*

FINAL REPORT

prepared by
GDS ASSOCIATES INC
EM CONSULTING