

**BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO**

In the Matter of the Application of Vectren	)	
Energy Delivery of Ohio, Inc. for Approval	)	
to Continue Demand Side Management	)	Case No. 19-2084-GA-UNC
Program for its Residential, Commercial, and	)	
Industrial Customers.	)	

**APPLICATION OF
VECTREN ENERGY DELIVERY OF OHIO, INC.
TO CONTINUE ITS DEMAND SIDE MANAGEMENT (DSM) PROGRAM FOR
RESIDENTIAL AND COMMERCIAL AND INDUSTRIAL CUSTOMERS**

Vectren Energy Delivery of Ohio, Inc. (VEDO or the Company), a CenterPoint Energy Company, in accordance and consistent with R.C. 4905.70, and R.C. 4929.02(A)(12), respectfully requests the Public Utilities Commission of Ohio (PUCO or Commission) grant VEDO authority to continue offering its Demand Side Management (DSM) Energy Efficiency (EE) Programs as described below and to the extent previously approved by the Commission in Case Nos. 04-571-GA-AIR, 05-1444-GA-UNC, 07-1080-GA-AIR, and 18-0298-GA-AIR; and any other necessary and proper relief. In support of this Application, VEDO states as follows:

1. VEDO is an Ohio corporation engaged in the business of transporting and distributing natural gas to approximately 320,000 customers in Dayton and west central Ohio. VEDO is a wholly-owned subsidiary of Vectren Corporation, the latter of which, as of February 1, 2019, is a wholly-owned subsidiary of CenterPoint Energy, Inc. (CenterPoint). *See* Notice of Consummation Transaction, Docket No. EC18-104-000, February 6, 2019. VEDO is a “public utility” and “natural gas company” as defined in R.C. 4905.02(A) and 4905.03(E), respectively, and is subject to the Commission’s jurisdiction in accordance with R.C. 4905.04, 4905.05, and 4905.06.

2. Pursuant to R.C. 4905.70, the Commission “shall initiate programs that will promote and encourage conservation of energy and a reduction in the growth rate of energy consumption, promote economic efficiencies, and take into account long-run incremental costs.”

3. Pursuant to R.C. 4929.02(A)(12), it is the policy of the state of Ohio to “[p]romote an alignment of natural gas company interests with consumer interests in energy efficiency and conservation.”

4. In support of these state policies, VEDO and its parent company, CenterPoint, strive to be a leader in energy efficiency and conservation; strongly believe EE programs are a cost-effective means to help customers lower their energy usage; and are committed to educating customers on conservation and wise energy use as evidenced by its long-standing history.

5. Since 2005, when the Commission originally approved the Vectren Weatherization Program, or VWP, in Case No. 04-571-GA-AIR, VEDO has provided funding for low-income conservation programs resulting in more efficient use and conservation of natural gas for qualifying customers in Ohio. Since 2009, when VEDO’s DSM Programs were established in Case No. 07-1080-GA-AIR, VEDO has provided funding for residential and small business EE and conservation programs. The conservation portfolio at issue includes resources, such as an online energy audit tool and dedicated conservation connection hotline, to assist customers in becoming more energy efficient and managing their bills. VEDO has also partnered with electric utility counterparts to offer integrated EE programs that provide both natural gas and electric savings. VEDO desires to continue to work with DSM and EE stakeholders to design and implement progressive, cost-effective programs.

6. As part of its most recent Rate Case in Case No 18-0298-GA-AIR, VEDO sought approval for cost recovery in base rates that would continue to fund its EE programs. In the

Opinion and Order entered on August 28, 2019, the Commission approved a Stipulation and Recommendation (the 2018 Rate Case Stipulation) that provided the Commission would approve VEDO's EE programs and funding via a separate application; removed all EE funding from VEDO's base rates; and provided all approved EE expenses would be recovered through the Energy Efficiency Funding Rider (EEFR), subject to application and dependent upon Commission approval. *In re Vectren Energy Delivery of Ohio, Inc.*, Case No. 18-298-GA-AIR, *et al.*, Opin. and Order (Aug. 28, 2019) pp 28-29 (2018 Rate Case).

7. Prior to and until such time as the Commission approves said application, the VEDO Collaborative, which was originally established by the Commission in Case No. 05-1444-GA-UNC, continues to monitor the implementation of EE programs, including the programs currently funded through the EEFR. The Collaborative provides input into the planning and administration of VEDO's EE programs and consists of the following representatives: VEDO, The Office of The Ohio Consumers' Counsel (OCC), Ohio Partners for Affordable Energy (OPAE), Environmental Law & Policy Center (ELPC), and the Commission's Staff as voting members. Additionally, Interstate Gas Supply (IGS) and Stand Energy serve as non-voting members.

8. Per the 2018 Rate Case Stipulation, the following provisions apply to VEDO's EE programs and EE expenses:

a. Unless directed otherwise by the Commission, the VEDO Collaborative will continue to meet and function under its existing responsibilities regarding selection, management, and review of EE programs for programs delivered through December 31, 2020.

b. If interested parties, such as VEDO, OCC, the Commission's Staff, *inter alia*, are able to negotiate and file an unopposed EE Plan by October 1, 2019, this unopposed EE Plan and the associated EE funding will take effect in 2020.

c. If an unopposed EE Plan is not filed by October 1, EE programs and funding continue through 2020 through the existing Collaborative model and procedures, and VEDO shall file an application by November 30, 2019 to seek Commission approval for an EE portfolio and EE funding to take effect beginning in 2021.

d. The EEFR will be the cost recovery mechanism for 100% of VEDO's approved EE costs. All EE costs are removed from VEDO's base rates.

2018 Rate Case Stipulation (Joint Exhibit 1.0), pp 5-6.

9. Following the August 28, 2019 Opinion and Order in Case No. 18-298-GA-AIR, the Collaborative met to discuss VEDO's proposed EE Plan but was unable to achieve agreement on EE programs and EE funding starting in 2020.

10. In accordance with the 2018 Rate Case Stipulation, this Application seeks approval of a triannual Gas DSM Program Plan for calendar years 2021 through 2023 ("2021 – 2023 Plan" or the "Plan"). Details of the 2021 – 2023 Plan can be found in Attachment A and summarized below in Table 1.

Table 1

Program	Description	2021-2023 Customers	2021-2023 Ccf Savings
Residential Prescriptive	Residential Prescriptive is designed to encourage customers to purchase high efficiency products that would have otherwise purchased standard efficiency products in the absence of the program	21,853	1,975,073
Home Insulation	The objective of the program is to deliver air sealing and insulation upgrades to serve individually metered 1-4-unit single family homes in the utility territory through a network of participating contractors.	4,918	640,250
School Education	The program is designed to raise awareness about how individual actions and low-cost measures can provide significant reductions in energy and water consumption	27,000	252,423
Multifamily Direct Install	The program is designed to produce immediate electric and gas energy savings in multifamily buildings through the direct installation of energy-saving measures	15,074	219,105
Home Energy Reports	Energy Efficiency behavior modification reports to motivate customers to engage in energy efficiency actions	102,000	729,300
Low Income	The program focuses on shell measures such as insulation and air sealing, but also includes replacement of non-functioning natural gas furnaces and water heaters, and minor repairs intended to increase the health and safety of the occupants of the home	1,002	208,593
Commercial Prescriptive	The program is designed to influence commercial customers to install energy efficient technologies.	413	154,253
Commercial Custom	The program encourages the purchase and installation of efficient technologies or implementation of process improvements	21	118,500

11. In this Application, VEDO proposes:

a. no changes to the currently approved procedures to review and adjust the EEFR, which is adjusted effective on or around June each year to enable VEDO to recover EE program costs for the current calendar year and reconcile program costs from the previous calendar year;

b. to continue using the VEDO Collaborative to review, evaluate, and monitor the EE program portfolio, under similar procedures that have been in place and established in Case Nos. 05-1444-GA-UNC and 07-1080-GA-AIR;

c. to dissolve Collaborative votes on operating plans and additional funding requests as VEDO will file with the Commission for program approval beginning with this case;

d. to continue to authorize the transfer of program funds across programs within a calendar year of a Commission approved Plan, details of which are provided in paragraph 17 below; and

e. to modify the Plan to include performance incentives based on a shared savings approach, details of which are provided paragraph 18 below.

12. VEDO's 2021 – 2023 Plan promotes the efficient use of energy aligning the Company's interests with those of its customers, which supports the State's policy (R.C. 4929.02(A)(12)). The Plan continues many of the 2019 program offerings while expanding and modifying some program designs. The Plan is designed to attract approximately 57,000 annual participants; proposes to invest approximately \$5.8 - \$6 million annually in the proposed programs; and is designed to cost effectively reduce energy use by approximately 1.4M Ccf – 1.45M Ccf each year over the three-year plan. Please see Attachment A, Table 1 for details on VEDO's Plan. The Plan is guided by VEDO's 2017 Ohio Market Potential Study (2017 MPS), copy provided at Attachment B and recommends gas EE programs for the residential and commercial & industrial (C&I) sectors in VEDO's service territory. Customers eligible to participate are Residential Rate Schedules 310, 311 and 315 and General Service Rate Schedules 320, 321, and 325.

13. The Plan was designed from the bottom up, referencing the 2017 MPS Study as a guide and factoring in experience within VEDO's territory; input from vendors with experience operating EE Programs for other utilities; and technical data on estimated plan participation, implementation costs, program changes, and enhancements. In particular, the 2017 MPS evaluated gas EE resources in the residential and commercial sectors for calendar years 2018-2023. The study included a detailed, bottom-up assessment of the VEDO market in the Dayton metropolitan area to deliver a projection of baseline gas energy use, forecasts of the energy savings achievable through efficiency measures, and program designs and strategies to optimally deliver those savings.

14. As set forth in Table 1 on page 8 of the 2021 – 2023 Plan (Attachment A), VEDO is seeking approval of its program and budgets.

15. Following Plan design, Morgan Marketing Partners conducted a cost-benefit analysis on VEDO's 2021 – 2023 Plan and associated assumptions. Morgan Marketing Partners used Plan program budgets and impacts with the DSMore Tool, a nationally recognized model, to run industry standard cost-effectiveness tests and evaluate the economic merits of the portfolio. The total portfolio for the VEDO Plan passed the Total Resource Cost (TRC) and Utility Cost Tests (UCT) for both the Residential and C&I sectors with each program passing the test with a benefit-to-cost (B/C) ratio greater than 1.0, indicating program benefits outweigh program costs. The Cost Effectiveness Results for each program are set forth in Table 8 on page 15 of the Plan (Attachment A).

16. Following Plan development, VEDO solicited feedback from the Collaborative for consideration in the final design and made several adjustments to the Plan design based on discussions with various Collaborative members.

17. While VEDO's 2021 – 2023 Plan largely extends the existing momentum of the portfolio programs from 2019 and 2020, VEDO proposes three notable refinements as a result of the discussions with various Collaborative members in September of 2019:

a. Multi-Family Direct Install (MFDI). For 2021, VEDO proposes to continue its partnership with Dayton Power & Light (DP&L) to purchase natural gas savings from DP&L's MFDI Program; however, new in 2021, VEDO's and DP&L's partnership will include installation of Smart Wi-Fi Thermostats, a program refinement designed to produce immediate electric and gas savings in multi-family units through the direct installation of energy saving measures. For 2022 and beyond, the program will be reviewed based upon the 2021 program participation, achievement, and cost effectiveness testing.

b. Home Insulation Program. For 2021, VEDO proposes to expand the program by offering the installation of Smart Wi-Fi Thermostat technology thereby enhancing overall program offering and providing customers greater control over their energy usage.

c. Energy Efficiency Kits. In 2021, VEDO proposes to discontinue the joint energy efficiency kit partnership with DP&L. VEDO proposes shifting the budget previously associated with the Energy Efficiency Kits to the MFDI Program.

18. Pages 17 – 29 of VEDO's Triannual Plan (Attachment A) provides detailed descriptions of each program.

19. In this Application, VEDO, after discussions with the Collaborative, proposes to continue to allow the shift or transfer of program funds across programs within a calendar year of a Commission-approved Plan which is consistent with VEDO's past practices since launching its EE programs in 2009. Authorizing the transfer of budgets within EE programs during the program year provides VEDO the flexibility to react to the market-based EE programs and shift

budgets based on a program's over-, or under-, performance thereby enabling the company to maximize its outreach to interested customers. Providing budget shift/transfer flexibility would strongly support the delivery of cost-effective programs while reaching as many customers as possible.

20. In support of R.C. 4929.02(A)(12), the opportunity for a natural gas company to earn a shared savings incentive based on prescribed levels of program savings achievement, as measured by recognized cost effectiveness tests, has been approved by the Commission as part of a beneficial DSM program. *In re Columbia Gas of Ohio, Inc.*, Case No. 16-1309-GA-UNC, *et al.*, Opin. and Order (Dec. 21, 2016) pp 51-63.

21. The Commission has already determined that VEDO's EE programs are cost effective and in the public interest. *In re Vectren Energy Delivery of Ohio*, Case No. 18-298-GA-AIR, Opin. and Order (Aug. 28, 2019) pp 68-69. The annual performance of the EE Plan will be evaluated using the UCT test. As part of its Plan, VEDO proposes the opportunity to earn a performance incentive to the extent such evaluation demonstrates that VEDO's Plan achieves savings at or in excess of 100% of the projected Plan benefits. VEDO's proposal is based on the same savings achievement tiers approved for Columbia Gas of Ohio as part of its most recent DSM program.

22. VEDO proposes shared savings to incentivize effectively and efficiently managing the programs and meeting or exceeding its program goals. Performance incentives encourage VEDO to invest in DSM while maximizing cost effectiveness, specifically trying to achieve maximum savings within its budget. Additionally, VEDO's savings goals are increasing over time while some of the traditional gas energy efficiency measures are no longer part of utility-sponsored programs due to market transformation or free ridership. VEDO continues to

look for new opportunities to reduce energy in customer homes and businesses as some cost-effective measures are no longer offered through VEDO's DSM programs.

23. Consistent with VEDO's overall objective to deliver cost-effective programs while maximizing benefits to customers, VEDO proposes a performance incentive to be tied to both tiered levels of energy savings achieved and the net present value (NPV) of the net benefits of the UCT. This type of structure encourages a utility to minimize program costs while also striving to achieve as much cost-effective EE as reasonably possible. VEDO proposes to collect performance incentives only if it reaches 100 percent of its portfolio savings target.

24. For purposes of determining the performance incentive, the calculation would be based on two components: (1) the NPV of the UCT test based on eligible program evaluation inputs; and (2) the portfolio savings achievement level based on gross reported savings of eligible programs. Once these components are determined, the NPV of the UCT is multiplied by the achievement level percentage to establish the final performance incentive. The proposed incentive achievement level values are as follows:

Performance Incentives	
Achievement Level Between (Ccf)	Incentive Level (NPV of net benefits of UCT)
≥125%	10%
120 and < 125%	9%
115 and < 120%	8%
110 and < 115%	7%
105 and < 110%	6%
100 and < 105%	5%

25. The performance incentive would apply to all programs, except the income qualified weatherization programs. The estimated average annual performance incentive, with

maximum achievement, would be approximately \$450,000. If achieved, the performance incentive would subsequently be recovered via the Company's annual EEFR filing, consistent with EE Program Plan costs.

26. Previously, the Commission has determined VEDO's EE Programs are cost effective; produce demonstrable benefits; have achieved or exceeded its savings goals for the past eight years; and are in the public interest and in compliance with R.C. 4929.02, based on information that is substantially unchanged. *In re Vectren Energy Delivery of Ohio*, Case No. 18-298-GA-AIR, Opin. and Order (Aug. 28, 2019) pp 68-69. *See also* Case No. 07-1825-GA-EXM, Opin. and Order (Apr. 30, 2008); Case No. 05-1444-GA-UNC, Opin. and Order (Sept. 13, 2006); Case No. 13-1571-GA-ALT, Opin. and Order (Feb. 19, 2014) (approving application and stipulation filed under R.C. 4929.05).

27. Approval of the 2021 – 2023 Plan remains in the public interest and its implementation is projected to produce demonstrable benefits, to include attracting approximately 57,000 annual participants and cost effectively reducing energy use by approximately 1.4M Ccf – 1.45M Ccf each year over the three-year plan. VEDO has been successful in delivery of EE programs for the past 10 years, proving to be cost-effective and successful in terms of program performance; achieving and exceeding its overall savings goal each year (provided at Attachment C); and helping customers save approximately 48 million cumulative Ccfs since 2009 (provided at Attachment D). The 2021 – 2023 Plan promotes energy conservation and encourages reduced energy consumption by providing opportunities for customers to reduce their energy usage and make more educated choices about how they consume energy in support of R.C. 4905.70 and 4929.02.

28. With approval and implementation of the 2021 – 2023 Plan, VEDO will continue to comply with R.C. 4905.35 and to substantially comply with the policies specified in R.C. 4929.02. None of the proposed programs in the 2021 – 2023 Plan will detrimentally affect VEDO’s compliance with state policy.

29. Per the terms of the 2018 Rate Case Stipulation, EE programs and funding through December 31, 2020 are continuing through the existing Collaborative model and procedures. In order to fund EE programs for 2021, and to ensure that there is sufficient lead time to budget for, design, and implement the EE programs and funding ultimately approved by the Commission for 2021, VEDO requests the Commission issue an accelerated procedural schedule for approval of the 2021 – 2013 Plan as follows:

December 31, 2019:	Motions to Intervene
January 31, 2020:	Initial Comments
February 28, 2020:	Reply Comments
March 31, 2020:	Opinion and Order

30. If, for any reason, a Commission decision approving VEDO’s Application, as filed or as modified, is not issued by or before November 30, 2020, VEDO requests that EE programs and funding continue beyond December 31, 2020, through the existing Collaborative model and procedures, on a temporary basis, until the Commission approves the 2021 – 2013 Plan to ensure VEDO is able to continue providing valuable DSM services to Ohio consumers.

31. Included with this Application, VEDO provides the following Attachments:

Attachment A: VEDO 2021-2023 Gas Energy Efficiency Plan

Attachment B: 2017 Market Potential Study and Action Plan

Attachment C: 2009-2018 Conservation Connection Ohio Scorecards

Attachment D: Historical Budget and Savings

WHEREFORE, VEDO respectfully requests that the Commission:

- a. Approve VEDO's 2021 – 2023 Plan and authorize VEDO to implement the EE programs contained therein at the proposed EE funding levels;
- b. Approve the performance incentive as described in the Application; and
- c. Grant any other necessary and proper approval in order to implement the relief requested in this Application.

Dated: November 22, 2019

Respectfully submitted:

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Attachment A



VEDO 2021-2023 Gas Energy Efficiency Plan

Prepared by:
VEDO Energy Delivery of Ohio, Inc. (VEDO)

11/20/2019

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List of Acronyms & Abbreviations

Acronym	Description
AEG	Applied Energy Group
AFUE	Annual Fuel Utilization Efficiency
BPI	Building Performance Institute
C&I	Commercial and Industrial
CCF	Hundred Cubic Feet
CNP	CenterPoint Energy
DP&L	Dayton Power and Light Company
DSM	Demand Side Management
EEFR	Energy Efficiency Funding Rider
EE	Energy Efficiency
ELPC	The Environmental Law & Policy Center
EM&V	Evaluation, Measurement and Verification
HWAP	Home Weatherization Assistance Program
IGS	Interstate Gas Supply
LOI	Letter of Intent
MOU	Memo of Understanding
MPS	Market Potential Study
OCC	Ohio Consumers' Counsel
OEP	Ohio Energy Project
OPAE	Ohio Partners for Affordable Energy
PCT	Participant Cost Test
PUCO	Public Utility of Ohio
RCX	Retro Commissioning Project
RIM	Ratepayer Impact Measure
UCT	Utility Cost Test
VEDO	Vectren Energy Delivery of Ohio
VWP	Vectren Weatherization Program
WACC	Weighted Average Cost of Capital

1. Introduction

Vectren Energy Delivery of Ohio, Inc. (“Vectren Ohio”), (“VEDO”), (“The Company”) provides energy delivery services to approximately 320,000 natural gas customers located in west central Ohio. Vectren Ohio is a direct, wholly owned subsidiary of Vectren Utility Holdings, Inc. and an indirect subsidiary of CenterPoint Energy (CNP), headquartered in Houston, TX. This VEDO 2021-2023 Gas Demand Side Management (DSM) Plan (“2021-2023 Plan” or “Plan”) describes the details of the gas Energy Efficiency (EE) programs VEDO plans to offer in its service territory in 2021-2023.

VEDO is proposing a 2021-2023 Plan designed to cost effectively reduce energy use by approximately 1.4M Ccf – 1.45M Ccf each year over the three-year plan. The EE program plan is guided by VEDO’s 2017 Ohio Market Potential Study (“2017 MPS”). The Plan includes program budgets, including the direct and indirect costs of energy efficiency programs. The 2021-2023 Plan recommends gas EE programs for the residential and commercial & industrial (C&I) sectors in VEDO’s service territory. VEDO utilizes a portfolio of DSM programs to achieve energy savings, thereby providing reliable gas service to its customers. VEDO’s DSM programs have historically been approved by the Public Utility of Ohio Commission (“Commission” or “PUCO”) via its energy efficiency tracker filings.

2. VEDO DSM Strategy

Energy efficiency remains at the core of VEDO’s culture as the utility strives to be a leader in conservation and energy efficiency and partner with customers to help them use energy wisely. VEDO and its new parent company, CenterPoint Energy, both have a long history of successfully delivering natural gas energy efficiency programs. The company proactively partners with its electric counterpart to offer integrated programs where applicable and works with collaborative groups in the various states it serves to assemble progressive, cost-effective programs that work toward achieving that objective.

A. Integration with Electric

Opportunities exist to gain both natural gas and electric savings from some EE programs and measures. In these instances, VEDO partners with Dayton Power & Light (DP&L) to capture the respective gas and electric energy savings. For the programs where integration opportunities exist, VEDO and DP&L allocate implementation costs based on the net benefits split between natural gas and electric. Below is a list of programs that VEDO has partnered with DP&L:

- Residential Prescriptive
- Home Insulation Program
- Home Energy Report
- Multi Family Direct Install
- Energy Efficient Schools
- Commercial Custom

B. VEDO Collaborative Group

The VEDO Collaborative Group (“Collaborative”) provides input into the planning and administration of VEDO’s EE programs. The Collaborative was formed in 2007 pursuant to the Final Order issued in Case No. 05-1444-GA-UNC and included the Ohio Consumers’ Counsel (OCC), Ohio Partners for Affordable Energy (OPAE), the Commission’s Staff, and VEDO as voting members. The order also granted Interstate Gas Supply (IGS) and Stand Energy to participate in the Collaborative as non-voting members representing the sector of competitive suppliers that are authorized to serve customers in VEDO’s service area. The Environmental Law & Policy Center (ELPC) was added as a voting member of the Collaborative in 2019 pursuant to the Final Order issued in Case No. 18-298-GA-AIR. VEDO would propose to continue its Collaborative structure for continued review and oversight over EE programs.

3. VEDO Planning Process

VEDO has offered a variety of EE programs since April 2009 and has engaged in a similar planning process each time a new portfolio is developed. The 2021-2023 Plan was developed by leveraging historical planning and implementation experience and referred to the 2017 MPS as a guide.

The 2021–2023 Plan continues the current program offerings, while expanding and modifying some program designs. The program plan design used the 2017 MPS for guidance to validate that the plan design and savings estimates were reasonable. While building from the bottom up with estimates from program implementers to help determine participation, this comparison to the MPS allowed the planning team to determine if the results were reasonable.

In 2017, VEDO engaged Applied Energy Group (“AEG”) and Morgan Marketing Partners to conduct an MPS and Action Plan. For this effort, AEG evaluated gas energy efficiency resources in the residential and commercial sectors for the years 2018-2023. The study included a detailed, bottom-up assessment of the VEDO market in the Dayton metropolitan area to deliver a projection of baseline electric energy use, forecasts of the energy savings achievable through efficiency measures, and program designs and strategies to optimally deliver those savings. The market potential study included:

- Market research & characterization
- Baseline forecast
- Measure characterization
- Estimate of energy efficiency potential
- Estimate of program potential and action plan
- Cost-benefit analysis
- Savings, participation, and budget for residential and commercial sectors by program and measure

In addition, vendors and other implementation partners who operate the current programs were involved in the planning process by providing suggestions for program changes and enhancements. The vendors and partners also provided technical information about measures such as recommended incentives, estimated participation and estimated implementation costs. This data provided a foundation for the 2021-2023 Plan based on actual experience within VEDO’s territory. These companies also bring their experience operating programs for other utilities. Once the draft version of the 2021-2023 Plan was developed, VEDO solicited feedback from the Collaborative Board for consideration in the final design. Based on discussions from various Collaborative members, several adjustments were made to the final program design presented in this plan.

Other sources of program information were also considered. Current evaluations and the Ohio Technical Resource Manual (TRM) were used for adjustments to inputs. In addition, best practices were researched and reviewed to gain insights into the program design of successful EE programs implemented by other utility companies.

4. Cost Effectiveness Analysis

VEDO’s last step of the planning process was the cost benefit analysis. VEDO retained Rick Morgan, President of Morgan Marketing Partners, to complete the cost benefit modeling. Utilizing DSMore, the measures and programs were analyzed for cost effectiveness. The DSMore tool is nationally recognized and used in many states across the country to determine cost-effectiveness. Developed and licensed by Integral Analytics based in Cincinnati, OH, the DSMore cost-effectiveness modeling tool takes hourly

prices and hourly energy savings from the specific measures/technologies being considered for the EE program, and then correlates both to weather. This tool looks at more than 30 years of historic weather variability to get the full weather variances appropriately modeled. In turn, this allows the model to capture the low probability, but high consequence weather events and apply appropriate value to them.

The outputs of DSMore include all the California Standard Practice Manual results including Total Resource Cost (TRC), Utility Cost Test (UCT), Participant Cost Test (PCT) and Ratepayer Impact Measure (RIM) tests. Inputs into the model include the following: participation rates, incentives paid, verified gross energy savings, life of the measure/program, implementation costs, administrative costs, incremental costs to the participant of the high efficiency measure, portfolio level costs, and escalation rates and discount rates. VEDO considers the results of each test and ensures that the portfolio passes the TRC test as it includes the total costs and benefits to both the utility and the consumer. The model includes a full range of economic perspectives typically used in EE and DSM analytics. The perspectives include:

- Total Resource Cost Test - shows the combined perspective of the utility and the participating customers. This test compares the level of benefits associated with the reduced energy supply costs to utility programs and participant costs.
- Utility Cost Test - shows the value of the program considering only avoided utility supply cost (based on the next unit of generation) in comparison to program costs.
- Participant Cost Test - shows the value of the program from the perspective of the utility's customer participating in the program. The test compares the participant's bill savings over the life of the EE/DR program to the participant's cost of participation.
- Ratepayer Impact Measure Test - shows the impact of a program on all utility customers through impacts in average rates. This perspective also includes the estimates of revenue losses, which may be experienced by the utility as a result of the program.

The cost effectiveness analysis produces two types of resulting metrics:

- Net Benefits (dollars) = $NPV \sum \text{benefits} - NPV \sum \text{costs}$
- Benefit Cost Ratio = $NPV \sum \text{benefits} \div NPV \sum \text{costs}$

Cost effectiveness analysis is performed using each of the four primary tests. The results of each test reflect a distinct perspective and have a separate set of inputs demonstrating the treatment of costs and benefits. A summary of benefits and costs included in each cost effectiveness test can be found in Appendix A.

5. 2021 - 2023 Plan Objectives and Impact

The framework for the 2021-2023 Plan was designed to reach an approximate 1.4M Ccf – 1.45M Ccf energy savings reduction. Table 1 provides an overview of budget, energy savings and participants by program and by year.

Table 1: VEDO 2021 - 2023 Plan Overview by Program

	Total Budget (\$)			Total Savings (ccf)			Total Participants/Measures		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Residential Programs									
Residential Prescriptive	* \$ 1,097,743	\$ 1,171,367	\$ 1,241,570	637,062	655,636	682,376	7,113	7,258	7,483
Home Insulation Program	* \$ 1,040,105	\$ 1,070,543	\$ 1,101,897	207,456	213,357	219,437	1,596	1,639	1,683
School Education Program	* \$ 288,258	\$ 295,942	\$ 303,843	84,141	84,141	84,141	9,000	9,000	9,000
VEDO/DP&L MFDI	* \$ 158,194	\$ 143,712	\$ 129,238	86,511	73,035	59,559	5,225	5,025	4,825
Home Energy Reports	* \$ 104,556	\$ 107,544	\$ 110,620	243,100	243,100	243,100	34,000	34,000	34,000
Low Income - VWP Program	\$ 2,102,145	\$ 2,104,894	\$ 2,107,698	69,531	69,531	69,531	334	334	334
Residential Subtotal	\$4,791,001	\$4,894,002	\$4,994,865	1,327,801	1,338,800	1,358,143	57,267	57,255	57,325
C&I Programs									
Commercial Prescriptive	\$ 202,223	\$ 203,136	\$ 190,966	51,962	53,211	49,080	135	145	134
Commercial Custom	* \$ 132,225	\$ 133,347	\$ 134,491	39,500	39,500	39,500	7	7	7
Commercial Subtotal	\$ 334,448	\$ 336,483	\$ 325,457	91,462	92,711	88,580	142	152	141
Portfolio Total	\$5,125,449	\$5,230,485	\$5,320,322	1,419,263	1,431,511	1,446,723	57,409	57,408	57,465
Contact Center	\$ 35,000	\$ 35,000	\$ 35,000						
Online Audit	\$ 84,714	\$ 87,255	\$ 89,873						
Outreach & Education	\$ 350,000	\$ 350,000	\$ 350,000						
Market Potential Study	\$ -	\$ 215,000	\$ -						
Evaluation	\$ 195,831	\$ 207,121	\$ 202,832						
Portfolio Level Costs Subtotal	\$ 665,544	\$ 894,376	\$ 677,705						
DSM Portfolio Total including Other Costs	\$5,790,994	\$6,124,861	\$5,998,027	1,419,263	1,431,511	1,446,723	57,409	57,408	57,465

* Denotes integrated programs with DP&L

A. Plan Savings

The planned savings goal for 2021-2023 was calculated based on guidance from the 2017 MPS in conjunction with historical portfolio participation. Table 2 demonstrates the portfolio, residential and C&I energy savings targets at the 0.4% - 0.5% eligible retail sales level. Table 3 demonstrates the portfolio energy and demand savings by program and by year.

Table 2: VEDO Ohio 2021 - 2023 Plan Portfolio Summary Planned Energy Savings

Portfolio Summary	ccf Savings		
	2021	2022	2023
Residential Total *	1,327,801	1,338,800	1,358,143
Commercial Total	91,462	92,711	88,580
Portfolio Total	1,419,263	1,431,511	1,446,723

* Includes Low Income Programs

Table 3: VEDO Ohio 2021 - 2023 Plan Portfolio Planned Energy Savings

		Total Participants/Measures		
Residential Programs		2021	2022	2023
Residential Prescriptive	*	7,113	7,258	7,483
Home Insulation Program	*	1,596	1,639	1,683
School Education Program	*	9,000	9,000	9,000
VEDO/DP&L MFDI	*	5,225	5,025	4,825
Home Energy Reports	*	34,000	34,000	34,000
Low Income - VWP Program		334	334	334
Residential Subtotal		57,267	57,255	57,325
C&I Programs		2021	2022	2023
Commercial Prescriptive		135	145	134
Commercial Custom	*	7	7	7
Commercial Subtotal		142	152	141
Portfolio Total		57,409	57,408	57,465

* Denotes integrated programs with DP&L

B. Plan Budget

The total planned program budget includes the direct and indirect costs of implementing VEDO's gas energy efficiency programs. In addition, a budget for indirect costs are being requested as described below.

Direct program costs include three main categories: vendor implementation, program incentives and administration costs. The program budgets were built based upon multiple resources. Program budgets were discussed with program implementers as a basis for the development of this plan. Vendor implementation budgets were estimated using historical data and estimates provided by the current vendors. This helps to assure that the estimates are realistic for successful delivery. Program incentives were calculated by assigning measures with appropriate incentive values based upon existing program incentives, evaluation results and vendor recommendations. Lastly, administrative costs are comprised of internal costs for VEDO's management and oversight of the programs. Administrative costs were allocated back to programs based on the percent of savings these programs represent as well as estimated staff time spent on programs.

Indirect costs are costs that are not directly tied to a single program, but rather support multiple programs or the entire portfolio. These include: Contact Center, Online Audit, Outreach & Education, Market Potential Study (MPS), and Evaluation, Measurement and Verification (EM&V). These costs are budgeted at the portfolio level. Tables 4 through 7 below list the summary budgets by year, program and category.

Table 4: VEDO 2021 – 2023 Summary Budgets by Year

Residential		2021	2022	2023	Total Budget
Residential Prescriptive	*	\$1,097,743	\$1,171,367	\$1,241,570	\$3,510,679
Home Insulation Program	*	\$1,040,105	\$1,070,543	\$1,101,897	\$3,212,545
School Education Program	*	\$288,258	\$295,942	\$303,843	\$888,043
VEDO/DP&L MFDI	*	\$158,194	\$143,712	\$129,238	\$431,144
Home Energy Reports	*	\$104,556	\$107,544	\$110,620	\$322,719
Low Income - VWP Program		\$2,102,145	\$2,104,894	\$2,107,698	\$6,314,737
Residential Total		\$4,791,001	\$4,894,002	\$4,994,865	\$14,679,867
Commercial & Industrial		2021	2022	2023	Total Budget
Commercial Prescriptive		\$202,223	\$203,136	\$190,966	\$596,325
Commercial Custom	*	\$132,225	\$133,347	\$134,491	\$400,063
Commercial & Industrial Total		\$334,448	\$336,483	\$325,457	\$996,389
Total Direct Program Costs		\$5,125,449	\$5,230,485	\$5,320,322	\$15,676,256
Indirect Portfolio Level Costs		2021	2022	2023	Total Budget
Contact Center		\$35,000	\$35,000	\$35,000	\$105,000
Online Audit		\$84,714	\$87,255	\$89,873	\$261,842
Outreach & Education		\$350,000	\$350,000	\$350,000	\$1,050,000
Market Potential Study		\$0	\$215,000	\$0	\$215,000
Evaluation		\$195,831	\$207,121	\$202,832	\$605,783
Indirect Portfolio Level Costs Subtotal		\$665,544	\$894,376	\$677,705	\$2,237,625
DSM Portfolio Total		\$5,790,994	\$6,124,861	\$5,998,027	\$17,913,881
* Denotes integrated programs with DP&L					

Table 5: VEDO 2021 Summary Budgets by Category

Residential		Administrative	Implementation	Incentives	Total Budget
Residential Prescriptive	*	\$ 217,350	\$ 132,942	\$ 747,451	\$ 1,097,743
Home Insulation Program	*	\$ 3,167	\$ 400,039	\$ 636,899	\$ 1,040,105
School Education Program	*	\$ 80,730	\$ 207,528	\$ -	\$ 288,258
VEDO/DP&L MFDI	*	\$ 24,840	\$ 133,354	\$ -	\$ 158,194
Home Energy Reports	*	\$ 12,420	\$ 92,136	\$ -	\$ 104,556
Low Income - VWP Program		\$ 152,145	\$ 1,950,000	\$ -	\$ 2,102,145
Residential Subtotal		\$ 490,652	\$ 2,915,998	\$ 1,384,350	\$ 4,791,001
Commercial & Industrial		Administrative	Implementation	Incentives	Total Budget
Commercial Prescriptive		\$ 62,100	\$ 3,778	\$ 136,345	\$ 202,223
Commercial Custom	*	\$ 62,100	\$ 35,000	\$ 35,125	\$ 132,225
Commercial Subtotal		\$ 124,200	\$ 38,778	\$ 171,470	\$ 334,448
Residential & Commercial Subtotal		\$ 614,852	\$ 2,954,777	\$ 1,555,820	\$ 5,125,449
Indirect Costs					Total Budget
Contact Center					\$ 35,000
Online Audit					\$ 84,714
Outreach & Education					\$ 350,000
Market Potential Study					\$ -
Evaluation					\$ 195,831
Indirect Cost Subtotal					\$ 665,544
DSM Portfolio Total					\$ 5,790,994

* Denotes integrated programs with DP&L

Table 6: VEDO 2022 Summary Budgets by Category

Residential		Administrative	Implementation	Incentives	Total Budget
Residential Prescriptive	*	\$ 221,277	\$ 138,984	\$ 811,106	\$ 1,171,367
Home Insulation Program	*	\$ 3,224	\$ 412,340	\$ 654,979	\$ 1,070,543
School Education Program	*	\$ 82,189	\$ 213,754	\$ -	\$ 295,942
VEDO/DP&L MFDI	*	\$ 25,289	\$ 118,423	\$ -	\$ 143,712
Home Energy Reports	*	\$ 12,644	\$ 94,900	\$ -	\$ 107,544
Low Income - VWP Program		\$ 154,894	\$ 1,950,000	\$ -	\$ 2,104,894
Residential Subtotal		\$ 499,517	\$ 2,928,400	\$1,466,085	\$ 4,894,002
Commercial & Industrial		Administrative	Implementation	Incentives	Total Budget
Commercial Prescriptive		\$ 63,222	\$ 4,194	\$ 135,720	\$ 203,136
Commercial Custom	*	\$ 63,222	\$ 35,000	\$ 35,125	\$ 133,347
Commercial Subtotal		\$ 126,444	\$ 39,194	\$ 170,845	\$ 336,483
Residential & Commercial Subtotal		\$ 625,961	\$ 2,967,594	\$1,636,930	\$ 5,230,485
Indirect Costs					Total Budget
Contact Center					\$ 35,000
Online Audit					\$ 87,255
Outreach & Education					\$ 350,000
Market Potential Study					\$ 215,000
Evaluation					\$ 207,121
Indirect Cost Subtotal					\$ 894,376
DSM Portfolio Total					\$ 6,124,861

* Denotes integrated programs with DP&L

Table 7: VEDO 2023 Summary Budgets by Category

Residential		Administrative	Implementation	Incentives	Total Budget
Residential Prescriptive	*	\$ 225,283	\$ 146,793	\$ 869,494	\$ 1,241,570
Home Insulation Program	*	\$ 3,283	\$ 425,011	\$ 673,603	\$ 1,101,897
School Education Program	*	\$ 83,676	\$ 220,166	\$ -	\$ 303,843
VEDO/DP&L MFDI	*	\$ 25,747	\$ 103,491	\$ -	\$ 129,238
Home Energy Reports	*	\$ 12,873	\$ 97,747	\$ -	\$ 110,620
Low Income - VWP Program		\$ 157,698	\$ 1,950,000	\$ -	\$ 2,107,698
Residential Subtotal		\$ 508,559	\$ 2,943,209	\$ 1,543,097	\$ 4,994,865
Commercial & Industrial		Administrative	Implementation	Incentives	Total Budget
Commercial Prescriptive		\$ 64,366	\$ 3,979	\$ 122,620	\$ 190,966
Commercial Custom	*	\$ 64,366	\$ 35,000	\$ 35,125	\$ 134,491
Commercial Subtotal		\$ 128,733	\$ 38,979	\$ 157,745	\$ 325,457
Residential & Commercial Subtotal		\$ 637,292	\$ 2,982,188	\$ 1,700,842	\$ 5,320,322
Indirect Costs					Total Budget
Contact Center					\$ 35,000
Online Audit					\$ 89,873
Outreach & Education					\$ 350,000
Market Potential Study					\$ -
Evaluation					\$ 202,832
Indirect Cost Subtotal					\$ 677,705
DSM Portfolio Total					\$ 5,998,027

* Denotes integrated programs with DP&L

C. Cost Effectiveness Results

The total portfolio for the VEDO programs pass the TRC and UCT test for both the Residential and Commercial & Industrial sectors. Tables 8 and 9 below confirm that all programs pass the TRC and UCT tests at greater than one, with and without shared savings. These results confirm the benefits of the programs outweigh the total costs to deliver EE programs. In completing the cost effectiveness testing for the Plan, VEDO used 7.48% as the weighted average cost of capital (WACC) as approved by the Commission on August 28, 2019 in Case No. 18-0298-GA-AIR.

Table 8: VEDO 2021-2023 Plan Cost Effectiveness Results

Vectren Ohio 2021-2023 Gas DSM Plan							
Cost Effectiveness Results							
Residential Programs		TRC	UCT	RIM	Participant	TRC Net Benefits	UCT Net Benefits
Residential Prescriptive	*	1.58	4.03	0.72	1.34	\$ 4,653,479	\$ 9,548,099
Home Insulation Program	*	1.63	2.87	0.84	1.22	\$ 3,204,352	\$ 5,394,470
School Education Program	*	1.31	1.31	0.53	0.00	\$ 249,773	\$ 249,773
VEDO/DP&L MFDI	*	2.88	2.88	0.67	0.00	\$ 732,641	\$ 732,641
Home Energy Reports	*	1.13	1.13	0.49	0.00	\$ 36,642	\$ 36,642
Low Income - VWP Program							
Residential Programs Total		1.61	3.12	0.74	1.47	\$ 8,876,886	\$ 15,961,625
C&I Programs		TRC	UCT	RIM	Participant	TRC Net Benefits	UCT Net Benefits
Commercial Prescriptive		1.83	1.94	0.48	3.15	\$ 473,505	\$ 507,072
Commercial Custom	*	1.74	2.50	0.51	3.08	\$ 381,079	\$ 539,099
C&I Programs Total		1.78	2.17	0.50	3.12	\$ 854,584	\$ 1,046,171
Portfolio Results		TRC	UCT	RIM	Participant	TRC Net Benefits	UCT Net Benefits
Residential and Commercial & Industrial Combined		1.49	2.59	0.68	1.56	\$ 8,317,053	\$ 15,593,378

* Denotes integrated programs with DP&L

Table 9: VEDO 2021-2023 Plan Cost Effectiveness Results with Performance Incentives

Including Performance Incentive		TRC	UCT	RIM	Participant	TRC Net Benefits	UCT Net Benefits
Total Portfolio		1.38	2.27	0.66	1.56	\$ 6,970,349	\$ 14,246,674

* Utility Performance Incentive does not include VWP (Low Income)

6. New or Modified Program Initiatives

VEDO's 2021-2023 filing largely extends the existing momentum of the portfolio of programs from 2019 and 2020 while applying the lessons learned from VEDO's program experience and evaluations as well as making refinements to key data and assumptions as described in this document.

Below is a summary which outlines notable changes for the 2021-2023 Plan from 2019-2020 plans. More in depth details on the following topics can be found within the Program Descriptions portion of this document.

A. Multi Family Direct Install

For 2021 VEDO is continuing its partnership with Dayton Power & Light (DP&L) to purchase natural gas savings from DP&L's Multifamily Direct Install Program (MFDI); however, new in 2021, VEDO and DP&L will include the installation of Smart Wi-Fi Thermostats. This program is designed to produce immediate electric and gas energy savings in multifamily units through the direct installation of energy-saving measures. Through outreach to property managers and holding companies, the program identifies eligible properties of five or more units in the DP&L and VEDO service territories through a single contact. For years 2022 and beyond, there is potential to increase smart Wi-Fi thermostat participation within this program. This will be reviewed based upon the achievement of 2021 participation and cost effectiveness testing.

B. Home Insulation Program

In 2021, the VEDO Home Insulation Program plans to expand by offering the installation of Smart Wi-Fi Thermostat technology. The direct installation of Smart Wi-Fi thermostats this will enhance the overall program offering to participants and provide customers an opportunity to take more control over their energy usage.

C. Energy Efficiency Kits

In 2021, VEDO plans to discontinue the joint energy efficiency kits partnership with DP&L. The budget associated with this program have been shifted to the Multi Family Direct Install program with DP&L and supports the offering of smart thermostats as an additional direct install measure.

7. Program Descriptions

A. Residential Prescriptive

The Residential Prescriptive Rebate Program is designed to influence customer purchasing decisions when replacing existing or installing new equipment. Financial incentives (online or mail-in rebates) are designed to encourage customers to purchase high efficiency products that would have otherwise purchased standard efficiency products in the absence of the program. These incentives help to reduce the incremental cost of purchasing higher efficiency and higher priced products. The program will foster sustainable improvements in the local VEDO market for these products. This will be accomplished using a combination of market push and pull strategies that stimulate demand from customers while simultaneously increasing trade ally investment in stocking and promotion of targeted products. The program will increase demand by educating customers about the energy and money saving benefits associated with efficient products via outreach and education, website and equipping trade allies to communicate the benefits to customers.

Eligible Customers

The Residential Prescriptive Rebate Program will target single-family residential homes and multi-family properties in rate classes 310, 311, and 315. Smart Wi-Fi Thermostat and Basic Wi-Fi Thermostat rebates will be limited to two per customer.

Marketing Plan

The marketing plan includes program specific materials that will target contractors, trade allies, distributors, manufacturers, industry organizations and appropriate retail outlets in the Heating, Ventilation and Air Conditioning (HVAC) industry. Marketing outreach medium include targeted direct marketing, direct contact by vendor personnel, trade shows and trade associations. VEDO will also use web banners, bill inserts, customer emails, social media outreach, press releases and mass market advertising. Program marketing will direct customers and contractors to the VEDO website or call center for additional information.

Initial Measures, Products and Services

The measures will include 95% and 97% AFUE Furnaces, 95% Boilers, a variety of ENERGY STAR qualified Smart Wi-Fi Thermostats as well as Basic Wi-Fi Thermostats.

Program Delivery

VEDO will oversee the program and partner with CLEAResult, Dayton Power & Light, and Uplight to deliver the program.

Integration with DP&L

VEDO and DP&L will offer Smart Wi-Fi Thermostats as an integrated natural gas/electric EE measure in its combined natural gas and electric service territory. VEDO is utilizing the DP&L online marketplace presence to offer joint rebate validation for dual utility customers for a streamlined rebate experience.

B. Multi Family Direct Install Program

Program Description

VEDO is engaged in a partnership with Dayton Power & Light (DP&L) to purchase natural gas savings from DP&L's Multifamily Direct Install Program. This program is designed to produce immediate electric and gas energy savings in multifamily buildings through the direct installation of energy-saving measures. Through outreach to property managers and holding companies, the program identifies eligible properties of five or more units in the DP&L and VEDO service territories through a single contact. Once outreach has identified, contacted and scheduled a property for installations, DP&L's field team installs appropriate qualifying measures, including 9W LED bulbs, 5W LED vanity globes, BR30 LED Dimmable bulbs, a DP&L night light, a Smart strip and water saving faucet aerators, showerheads and smart thermostats. There is no cost to the properties for these installations. Marketing collateral, including a flyer with program description, is available for outreach, and door hangers, which property managers can use for notification to tenants, are given to scheduled properties.

Eligible Customers

Any residential customer located in the VEDO gas service territory.

Marketing Plan

Through outreach, the program identifies property managers and holding companies that can be engaged to reach several properties through a single contact, as well as identifying other eligible properties.

Initial Measures, Products and Services

Details of the measures, savings, and incentives can be found in Appendix B. Measures included in the program will change over time as baselines change, new technologies become available and customer needs are identified.

Program Delivery

VEDO will oversee the program and will partner with DP&L to deliver the program.

Integration with DP&L

VEDO and DP&L will offer smart thermostats as an integrated natural gas/electric EE measure in its combined natural gas and electric service territory. VEDO has allocated \$50 per thermostat cost sharing with DP&L and has an agreed upon Memo of Understanding (MOU) to purchase \$1.108 per ccf savings from DP&L for gas measures installed.

C. Home Insulation Program

Program Description

The Home Insulation and Air Sealing Program is a trade ally driven market approach to comprehensive energy efficiency projects. The objective of the program is to deliver air sealing and insulation upgrades to serve individually metered 1-4-unit single family homes in VEDO's territory through a network of participating contractors. The program administrator will offer to install the applicable measures during a quality control walk through process. VEDO's implementor will continue to recruit and train insulation contractors to offer and provide recommended shell improvements to their existing customers. Contractors will also receive training and supervision on air sealing, which may be unfamiliar to insulation contractors. The program will continue to rely on Building Performance Institute (BPI) certified contractors to assess needs, provide recommendations, sell and install air sealing and insulation projects.

The program will offer cash incentives to help customers pay for the improvement work and to encourage customers to move forward and install comprehensive improvement packages. There are two "major measure" categories:

- Air sealing (includes closure of open flues)
- Insulation Wall & Attic
- Smart Wi-Fi Thermostats

Air sealing is required prior to establishing any insulation measures. To make it more affordable for customers to participate in the program, the rebate amount will be deducted from the total cost of the work scope and will be paid to the contractor once the project is completed. Smart Wi-Fi thermostats will be directly installed for the participating customer.

Eligible Customers

The program is available to VEDO residential natural gas customers in single family homes.

Marketing Plan

CLEAResult, in conjunction with VEDO's existing marketing strategy for energy efficiency programs, will use a program-specific marketing plan and communications strategy to reach eligible customers. CLEAResult will also coordinate with trade allies with a customer base that would be receptive to the program.

Program Delivery

VEDO will oversee the program and will partner with CLEAResult to deliver the program.

D. School Education Program

Program Description

The School Education Program is designed to raise awareness about how individual actions and low-cost measures can provide significant reductions in energy and water consumption. The program is offered to 5th-12th grade students who attend school within in the VEDO service territory. The goal of the program is to influence and educate students about conservation, the efficient use of natural gas, and to show their families how to be smart energy consumers. Families become involved as students are given energy efficient kits to take-home and the assignment to improve energy use in their own homes. The program is very effective in teaching students, families and teachers about how to use energy efficient devices and adopt conservation and energy efficiency behaviors. Program participants are encouraged to return a Home Installation Survey which provides valuable information on the adoption and installation of the energy savings measures. The program curriculum teaches energy efficiency programs aligned to Ohio's educational standards and Common Core. The program is a collaborative effort with Dayton Power & Light (DP&L) by cobranding materials and sharing costs and savings.

Eligible Customers

The target market for this program is children in 5th-12th grade attending school systems within the VEDO service area.

Marketing Plan

The delivery organization's curriculum is correlated to meet the Ohio Academic Content Standards. They will communicate directly with schools through letters and electronic communication systems utilized specifically by teachers or education administrators.

Initial Measures, Products and Services

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

- Kitchen & Bathroom Aerators
- Filter Whistle
- LED Bulbs
- LED Night Light
- High Efficiency Showerhead
- Pipe Wrap
- Water Heater Temperature Setback

Program Delivery

Ohio Energy Project (OEP) serves as the School Education Program vendor. OEP is an educational organization that provides energy education, interactive learning tools and programs for students, educators and business partners.

Integration with DP&L

VEDO and DP&L will offer School Education Kits and are sharing the cost of these kits based on the percent of savings by fuel within the kit.

E. VEDO/DP&L Joint Residential Behavioral Program

Program Description

The Residential Behavior Partnership Program is an integrated gas and electric program with Dayton Power and Light (DP&L). The program motivates behavior change and provides relevant, targeted information to the consumer through regularly scheduled direct contact. The direct contact, typically through letters, helps the consumer to better understand their energy use. Once a consumer understands better how they use energy, they can then start conserving energy.

The program provides co-branded letters to residential customers in the VEDO and DP&L service territory to consumers combining energy usage data along with customer demographic, housing and utility data to develop specific, targeted recommendations that educate and motivate consumers to reduce their energy consumption. The recommendations provided in the letter give the consumer a variety of ways to save

Eligible Customers

The program is available to DP&L residential electric customer and VEDO residential natural gas customers. Customers will be able to opt out of receiving the letters; otherwise the customer will automatically receive the letters.

Marketing Plan

Program data and design will be delivered by a third-party vendor who provides energy usage insight that drives customers to act by selecting the most relevant information for each household, which ensures maximum relevancy and high response rate to the recommendations. Eight mailed reports will be sent annually to approximately 34,000 participants.

Initial Measures, Products and Services

Letters to residential customers in the VEDO and DP&L service territory to consumers combining energy usage data along with customer demographic, housing and utility data to develop specific, targeted recommendations that educate and motivate consumers to reduce their energy consumption. The recommendations provided in the letter give the consumer a variety of ways to save energy (both gas and electric) in their home, from low to no cost to higher cost investments.

Program Delivery

VEDO and DP&L will oversee the program and partner with vendor to deliver the program. This program works in coordination with DP&L's electric behavioral program to ensure the most effective and efficient delivery of this program and to yield higher savings than implementation of a gas only or electric only program. Customers will receive 8 reports annually and monthly emailed reports. These reports provide

updates on energy consumption patterns compared to similar homes and provide energy savings strategies to reduce energy use. They also promote other VEDO's programs to interested customers.

Integration with DP&L

VEDO and DP&L use the overlay of both service territories in order to share costs at the vendor level for both sets of customers as well as enhance the customer experience in receiving cobranded reports.

F. Commercial Prescriptive Program

Program Description

Like the Residential Prescriptive program, the Commercial Prescriptive Rebate Program is designed to influence commercial customers to install energy efficient technologies. Financial incentives (mail-in rebates) are intended to encourage customers to purchase high efficiency products that would have otherwise purchased standard efficiency products in the absence of the program.

The program will increase demand by educating customers about the energy and money saving benefits associated with efficient products via outreach and education, website and equipping trade allies to communicate such benefits to customers. The program will foster sustainable improvements in the local VEDO market for these products. Product availability is addressed as market providers adjust to meet increased demand generated by incentive offers and consumer education activities.

Eligible Customers

Commercial Prescriptive rebates target commercial customers in rate classes 320, 321 and 325, defined as those whose annual usage is less than 150,000 Ccf.

Marketing Plan

The Commercial Prescriptive Rebate Program relies on networking with trade allies, mass media messages to consumers and businesses, and website tools and promotions.

Initial Measures, Products and Services

Details of the measures:

- 95% & 97% Furnace
- 90% Boiler
- Boiler Tune Up
- Smart Wi-Fi Thermostat
- Combination Oven
- Dishwasher
- Steam Cooker
- Convection Oven
- Gas Fryer
- Unit Heater
- Infrared Heater

Program Delivery

VEDO staff will oversee the program and will utilize the services of CLEAResult to perform rebate fulfillment services.

G. Commercial Custom Program

Program Description

The Commercial Custom Program offers business customers incentives for qualifying energy efficiency upgrades not covered under the Commercial prescriptive rebate program. This program encourages the purchase and installation of efficient technologies or implementation of process improvements. VEDO will again partner with a qualified implementation subcontractor, Heapy Engineering, to deliver this program.

VEDO's field representative will work directly with key customers and market providers to identify potential energy savings projects and answer questions on program requirements. Once prospective energy saving projects are identified, VEDO's representative and Heapy Engineering will work with the customer and/or market provider to complete custom engineering calculations.

If the project is deemed eligible, Heapy Engineering and VEDO will assist the customer or market provider in completing the grant application and will manage the allocation of funds. Prior to starting a project, customers must complete an application and attach documentation verifying the energy savings potential, payback horizon, project eligibility and incentive amount. When the project is approved, VEDO will send a Letter of Intent (LOI) to the applicant confirming the amount of the incentive that will be paid once the project is completed.

Once projects are implemented, the customer will submit incentive claims along with all necessary documentation to VEDO. Heapy Engineering will review the applications and a qualified engineer will verify savings calculations are correct prior to payment. The VEDO representative will monitor the status of the rebate application and project until the point of payment.

In addition to our traditional Custom Program as described above, VEDO is also partnering with DP&L and their Retro Commissioning Program (RCx) to identify customers with potential energy savings opportunities that can be accomplished with minimal cost outlay. This program involves an energy audit that is cost shared by the customer, VEDO and DP&L. The results of the audit are then presented to the customer. The customer then applies for our Custom program incentives based on the measures chosen. The customer then completes the installation of preapproved cost-effective measures and receives incentives through the Commercial Custom Program procedure.

Eligible Customers

Commercial customers in rate classes 320, 321 and 325, defined as those whose annual usage is less than 150,000 Ccf.

Marketing Plan

VEDO will provide outreach and education to contractors to inform them of the program offerings through direct contacts with key customers and market providers (e.g. mechanical contractors). This approach is highly dependent upon referrals and networking with trade allies to identify projects. Outreach will include in-person visits to customers and market providers, attending and presenting at public seminars and trade association meetings, (e.g. ASHRAE, school administrators, hospitality), direct mail, newsletters and other targeted media and networking.

Program Delivery

VEDO will contract with a local engineering firm, Heapy Engineering, to perform the engineering review and rebate fulfillment for this program.

H. VEDO Weatherization Program

Overview: VEDO Weatherization Program (VWP) is a low-income weatherization program that assists VEDO customers to make energy efficient improvements to their homes. The program is administered by Miami Valley Community Action Partnership (“Miami CAP”) and improvements are provided at no cost to the customer. Miami CAP subcontracts with three smaller CAP agencies in order to deliver services to all VEDO’s service territory. The VEDO Weatherization Program is divided into two sections based on income eligibility requirements.

Program Description: The program focuses on shell measures such as insulation and air sealing, but also includes replacement of non-functioning natural gas furnaces and water heaters, and minor repairs intended to increase the health and safety of the occupants of the home. Participation is limited by the annual budget and a waiting list of eligible customers is maintained for each program.

1. VWP I

VWP I provide single-family home weatherization services for customers with incomes up to 200% of the federal poverty guidelines. The program was initiated in 2005 and is funded by through VEDO EEFR \$1.1M annually. The program includes measures and protocols prescribed by the State of Ohio Home Weatherization Assistance Program (HWAP). VWP I program design permits service to income eligible customers on either a stand-alone basis or in conjunction with the HWAP.

2. VWP II

VWP II was launched in 2007 and originally funded at \$2 million for a two year period.¹ Subsequently, VWP II was identified as an additional program to be funded by the EEFR rider at approximately \$1 million annually.² VWP II is a unique income-qualified program that funds home weatherization for customers in the range of 201% up to 300% of the federal poverty income guidelines. VWP II is intended to benefit customers who have traditionally been unable to access any sort of assistance funds, yet do not have the disposable income to make needed energy efficiency improvements to their homes. The program includes measures and protocols prescribed by the State of Ohio Home Weatherization Assistance Program (HWAP).

¹ As a result of Case No. 05-1444-GA-UNC.

² As part of the settlement agreement in Case No. 18-0298-GA-AIR

Eligible Customers

Residential single-family home customers with income up to 300% of the federal poverty level income guidelines.

Implementation & Delivery Strategy

VEDO contracts with an independent inspector to perform quality assurance inspections for the VWP programs. This ensures that weatherization service work is completed to the highest standards and that no safety or health hazards exist due to the work performed through the programs. On-site quality checks are performed for a percentage of all programs as follows:

- VWP I: 10% of jobs completed within 0-200% federal poverty income level range.
- VWP II: 15% of all homes weatherized through the program.

For both VWP I and VWP II, desk reviews are performed on 60% of the homes weatherized through these programs. Desk reviews verify that the appropriate paperwork and permits are filed and that required city inspections on furnace and water heater work are performed.

Program Delivery

VEDO will oversee the program and partner with Miami Valley Community Action Partnership to deliver the program.

8. Support Services

Support services are considered indirect costs which support the entire portfolio and include: Contact Center, Online Audit, Outreach & Education, and Evaluation, Measurement and Verification (EM&V). These costs are budgeted at the portfolio level.

Table 10: Portfolio Level Costs by Year

Indirect Portfolio Level Costs	2021	2022	2023
Contact Center	\$35,000	\$35,000	\$35,000
Online Audit	\$84,714	\$87,255	\$89,873
Market Potential Study	-	\$215,000	-
Outreach & Education	\$350,000	\$350,000	\$350,000
Evaluation	\$195,831	\$207,121	\$202,832
Total Indirect Portfolio Level Costs	\$665,544	\$894,376	\$677,705

A. Energy Efficiency Advisory Team

The Energy Efficiency Advisory Team is a dedicated call center team that provides an energy efficiency and conservation advisory service for Vectren. They help educate customers on our program offerings, conservation practices, and are referred from the company's general call center to understand their energy usage. A toll-free number is provided on all outreach and education materials. Direct calls are initial contacts from customers or market providers coming through the dedicated toll-free number printed on all Vectren's conservation materials. Transferred calls are customers that have spoken with a Vectren Contact Center Agent and have either asked or been offered a transfer to an Energy Efficiency Advisor who is trained to respond to energy efficiency questions or conduct the on-line energy audit. These customer communication channels provide support mechanisms for VEDO customers to receive the following services:

- Provide general guidance on energy saving behaviors and investments using customer specific billing data via the on-line tool (bill analyzer and energy audit).
- Respond to questions about the residential and general service programs.
- Facilitate the completion for customers without internet access or who have difficulty understanding how to use the tool.
- Respond to inquiries about rebate fulfillment status.
- Provide general guidance on energy saving behaviors and investments using customer specific billing data via the on-line tool (bill analyzer and energy audit).
- Respond to questions about the residential and general service programs.
- Facilitate the completion of and provide a hard copy report from the online audit tool for customers without internet access or who have difficulty understanding how to use the tool.

To ensure that the Energy Efficiency Advisors are providing the most appropriate and best value-added service to VEDO customers, Vectren began a continuous improvement and training effort in 2013. This effort focuses on preparing these representatives with resources, training, tools and tips to be able to provide a more consultative response and customized recommendations to customers who are seeking information and solutions regarding energy efficiency. What is appropriate for one customer might not suit another customer's needs, and the continuous training process will better equip representatives to be able to provide solutions that fit the customer's individual situation.

B. Online Audit

The Online Energy Audit tool is a customer engagement and messaging tool that uses actual billing data from a customer's energy bills to pinpoint ways to save energy in their home. Data collected drives account messaging through providing tips and rebates relevant to that customer's situation. Additionally, data collected from the online energy audit is used to validate neighbor comparison data, which illustrates how the customer's monthly energy use compares to their neighbors and is designed to inspire customers to try and save more energy than their efficient neighbors. This tool provides the online ability and means to communicate, cross promote, and educate customers about energy efficiency and VEDO's energy efficiency programs. The Online Energy Audit tool provides tools and messaging to educate customers and provide suggestions, tips, and advice on energy usage.

C. Outreach & Education

The mission of energy efficiency programs provided by VEDO is to educate and encourage customers to make energy efficient decisions for their home and/or business. Typically, VEDO practices a multi-faceted approach to ensure the communication channels to reach each program target are utilized. In 2021 VEDO will continue to employ a two-part endeavor for mass program outreach. Using creative methods, media messages will be short, quick and succinct featuring appliance rebates, programs and tips. Bill inserts, press releases, customer e-mails and a variety of mass media messaging will assist VEDO in educating customers about rebate programs available to help assist the choice of high efficiency. Mass media outreach will focus on television, radio and print advertising, as well as digital marketing including YouTube, Pandora, Weather.com, Hulu, Twitter, Facebook and web display. We launched a redesigned, mobile-responsive website in May 2017 which includes an enhanced Save Energy portion which outlines and details energy efficiency programs much more robustly than before. We also launched high energy usage alert emails to notify customers in the middle of a billing cycle when weather indicates they are on track for a higher bill than expected. This email includes tips and ideas for conserving energy to reduce consumption before the billing cycle ends. We expect to continue enhancements throughout 2021 and beyond, including directing customers to create an online account to view their energy usage comparisons and participate in online

energy audits. We also plan to continue our high energy usage alert email broadcast to all our service territory as an additional customer experience tool.

The mass media campaign will be a multi-week promotion of the Residential Prescriptive Rebate program and Home Insulation Program. Energy tips will also be promoted. The campaign will kick off in the fall and run continuously through the end of December. This campaign will incorporate television, radio, print ads and an online presence. In addition, we will incorporate on-bill messaging, email newsletters and social media posts detailing the available programs throughout the year.

We have also engaged in a partnership with the City of Dayton and plan to work with them as well as any interested stakeholders to host up to two workshops per year for both residential and commercial customers to assist in education on how to reduce energy usage.

Additional outreach and education through direct mail and electronic communications provides traditional energy efficiency tips and comprehensive outreach to VEDO's customers. Information regarding the availability of incentives, program requirements, rebate claim forms, and product fact sheets is available through VEDO's website at <https://www.vectren.com/SaveEnergy>. This resource serves both customers and trade allies seeking information and program materials.

D. Market Potential Study

VEDO is requesting \$215,000 to complete a comprehensive Market Potential Study (MPS) for the years of 2023 and beyond, which is scheduled for 2021. VEDO will issue a Request for Quote to select a consultant to perform this work.

E. Evaluation

VEDO will work with an independent third-party evaluator to conduct an evaluation of DSM programs approved as part of its 2021-2023 Action Plan. The evaluation will include standard EM&V analyses, such as a process, impact, and/or market effects evaluation of VEDO's portfolio of DSM programs. EM&V costs are based on 5% of the budget and allocated at the portfolio level.

9. Conclusion

VEDO has developed a 2021-2023 Gas Energy Efficiency Plan with the guidance of the 2017 VEDO MPS and is reasonably achievable and cost effective. The cost effectiveness analysis was performed for 2021-2023 using the DSMore model – a nationally recognized economic analysis tool that is specifically designed to evaluate the cost effectiveness of implementing energy efficiency and demand response programs.

Program costs were determined by referencing 2019 program delivery costs, based on prior contracts and performance in the field and consultation with the program vendors that will deliver the DSM Plan. Energy and demand savings were primarily determined by using recent EM&V results. For measures that were not addressed in the OH TRM or EM&V, VEDO used Technical Resource Manual resources from nearby states or vendor input.

Based on this information, VEDO requests PUCO approval of this 2021-2023 DSM Plan as well as the costs associated the Market Potential study for 2023 and beyond.

10. Appendix A: Cost Effectiveness Tests Benefits & Costs Summary

Test	Benefits	Costs
Participant Cost Test	• Incentive payments • Annual bill savings • Applicable tax credits	• Incremental technology/equipment costs • Incremental installation costs
Utility Cost Test (Program Administrator Cost Test)	• Avoided energy costs • Avoided capacity costs	• All program costs (startup, marketing, labor, evaluation, promotion, etc.) • Utility/Administrator incentive costs
Rate Impact Measure Test	• Avoided energy costs • Avoided capacity costs	• All program costs (startup, marketing, labor, evaluation, promotion, etc.) • Utility/Administrator incentive costs • Lost revenue due to reduced energy bills
Total Resource Cost Test	• Avoided energy costs • Avoided capacity costs • Applicable participant tax credits	• All program costs (not including incentive costs) • Incremental technology/equipment costs (whether paid by the participant or the utility)

11. Appendix B: Program Measure Detail

Program	Measure	Measure Life	Average Savings per Unit (CCF)	2021 Participation	2022 Participation	2023 Participation	Average Incentive Paid per Unit	Average Incremental Cost	2021 Ccf Savings	2022 Ccf Savings	2023 Ccf Savings
Residential Prescriptive											
Residential Prescriptive	95% Furnace	20	133.00	1,620	1,499	1,496	\$ 150	\$ 689	215,430	199,367	198,968
Residential Prescriptive	97% Furnace	20	151.24	660	858	987	\$ 400	\$ 867	99,805	129,746	149,208
Residential Prescriptive	95% Boiler	18	193.00	35	29	31	\$ 500	\$ 750	6,659	5,597	5,983
Residential Prescriptive	Wifi Tstat Basic	15	57.59	833	749	674	\$ 30	\$ 103	47,946	43,151	38,836
Residential Prescriptive	Wifi Tstat Smart	15	67.38	3,966	4,123	4,295	\$ 50	\$ 196	267,223	277,775	289,381
Total Residential Prescriptive *				7,113	7,258	7,483			637,062	655,636	682,376
Home Insulation Program											
Home Insulation Program	Wall Insulation	25	231.18	270	279	287	\$ 539	\$ 1,369	62,523	64,398	66,330
Home Insulation Program	Attic Insulation	25	129.01	571	588	606	\$ 554	\$ 1,564	73,709	75,920	78,198
Home Insulation Program	Air Sealing	15	101.7	595	613	631	\$ 236	\$ 320	60,511	62,326	64,196
Home Insulation Program	Smart Tstats	15	67.38	159	159	159	\$ 215	-	10,713	10,713	10,713
Total Home Insulation Program *				1,596	1,639	1,683			207,456	213,357	219,437
School Education Program											
School Education Program	Units (kits)	10	9.349	9,000	9,000	9,000	\$ -	\$ -	84,141	84,141	84,141
Total School Education Program *				9,000	9,000	9,000			84,141	84,141	84,141
MDFI Program											
MDFI Program	Bathroom Aerator 1.0 gpm - Gas DHW	10	2.74	2,244	2,244	2,244	\$ -	\$ -	6,145	6,145	6,145
MDFI Program	Kitchen Flip Aerator 1.5 gpm - Gas DHW	10	7.78	590	590	590	\$ -	\$ -	4,585	4,585	4,585
MDFI Program	Low Flow Showerhead 1.5 gpm - Gas DHW	10	12.01	1,541	1,541	1,541	\$ -	\$ -	18,508	18,508	18,508
MDFI Program	Smart Thermostats	15	67.38	850	650	450	\$ -	\$ 50	57,273	43,797	30,321
MDFI Program Total *				5,225	5,025	4,825			86,511	73,035	59,559
Residential Behavioral Program											
Residential Behavioral Program	Reports	1	7.15	34,000	34,000	34,000	\$ -	\$ -	243,100	243,100	243,100
Residential Behavioral Program Total *				34,000	34,000	34,000			243,100	243,100	243,100
Low Income Weatherization											
Low Income Weatherization 1	Homes	20	203	201	201	201	\$ -	\$ -	40,803	40,803	40,803
Low Income Weatherization 2	Homes	20	216	133	133	133	\$ -	\$ -	28,728	28,728	28,728
Low Income Weatherization Total				334	334	334			69,531	69,531	69,531
Sub-Total Residential				57,267	57,255	57,325			1,327,801	1,338,800	1,358,143
Commercial Prescriptive Program											
Commercial Prescriptive Program	95% Furnace	20	140.96	40	35	35	\$ 300	\$ 689	5,638	4,934	4,934
Commercial Prescriptive Program	97% Furnace	20	190.52	5	17	11	\$ 400	\$ 867	953	3,239	2,096
Commercial Prescriptive Program	90% Boiler	20	886.22	30	28	24	\$ 3,000	\$ 2,400	26,143	24,519	21,269
Commercial Prescriptive Program	Boiler Tune Up	5	165	19	23	20	\$ 250	\$ 300	3,135	3,795	3,300
Commercial Prescriptive Program	Wifi Tstat Smart	15	253	13	14	13	\$ 50	\$ 196	3,289	3,416	3,163
Commercial Prescriptive Program	Combi Oven	12	661	8	8	8	\$ 2,225	\$ 2,125	5,288	5,288	5,288
Commercial Prescriptive Program	Dishwasher	16	557	4	4	4	\$ 145	\$ 211	2,228	2,228	2,228
Commercial Prescriptive Program	Steam Cooker	12	148	3	3	3	\$ 680	\$ 998	444	444	444
Commercial Prescriptive Program	Convection Oven	12	263	3	3	3	\$ 975	\$ 1,113	789	789	789
Commercial Prescriptive Program	Gas Fryer	12	505	5	6	8	\$ 550	\$ 1,200	2,525	3,030	4,040
Commercial Prescriptive Program	Unit Heater	15	266	1	1	1	\$ 350	\$ 676	266	266	266
Commercial Prescriptive Program	Infrared Heater	15	316	4	4	4	\$ 500	\$ 920	1,264	1,264	1,264
Commercial Prescriptive Program Total				135	145	134			51,962	53,211	49,080
Commercial Custom Program											
Commercial Custom Program	Small (< 7500 Therms)	20	3,500	5	5	5	\$ 2,625	\$ 5,974	17,500	17,500	17,500
Commercial Custom Program	Large (>=7500 Therms)	20	11,000	2	2	2	\$ 11,000	\$ 33,000	22,000	22,000	22,000
Commercial Custom Program Total *				7	7	7			39,500	39,500	39,500
Sub-Total Commercial				142	152	141			91,462	92,711	88,580
Portfolio				57,409	57,408	57,465			1,419,263	1,431,511	1,446,723
* Denotes integrated programs with DP&L											

Attachment B



MARKET POTENTIAL STUDY AND ACTION PLAN

FINAL DRAFT: October 3, 2017

Report prepared for:
VECTREN ENERGY DELIVERY OF OHIO, INC.

Energy Solutions. Delivered.

This study was performed as a joint effort between Applied Energy Group (AEG) and Morgan Marketing Partners (MMP). AEG had primary responsibility for the first phase, the potential study, and for overall project management and reporting. MMP had primary responsibility for development of the program designs and action plan.

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EXECUTIVE SUMMARY

Vectren Energy Delivery of Ohio (VEDO) provides energy delivery services to approximately 314,000 natural gas customers located in west central Ohio. Vectren attempts to maintain an ongoing focus on the need to conserve natural resources as it provides energy and energy-related solutions that make its customers productive, comfortable and secure. This market potential study identifies opportunities for future energy conservation activities, as well as an action plan for achieving energy savings goals.

The study focuses only on residential and small commercial (non-transport) customers, since these sectors are the target of VEDO programs. It includes the findings of market research, as well as detailed analysis and actionable targets covering the time period 2018-2023. The analysis also includes estimates of potential energy savings, customer program participation, and plausible budgets for residential and commercial sectors, by program and by measure. Program designs and an action plan to deliver a cost-effective portfolio were also developed and are included in study materials.

This study was performed as a joint effort between Applied Energy Group (AEG) and Morgan Marketing Partners (MMP). AEG had primary responsibility for the first phase (the potential study), and for overall project management and reporting. MMP had primary responsibility for development of the program designs and action plan.

Overview of Approach

The first phase of this study, the **Market Potential Study (MPS)**, developed a reliable and transparent estimate of DSM market potential at the measure level. The AEG team performed the following steps to meet VEDO's key objectives for the market potential study:

- Used information and data from VEDO, as well as secondary data sources, to describe how customers currently use natural gas by sector, segment, end use and technology.
- Identified a comprehensive set of demand-side resources and measures relevant for each sector.
- Developed a baseline projection of how customers are likely to use natural gas in the absence of future energy efficiency (EE)¹ programs. This baseline projection defines the metric against which future program savings are measured. This projection leveraged updated technology data, modeling assumptions, and measure baselines that reflect both current and anticipated federal, state, and local energy efficiency legislation that will impact downstream demand-side management (DSM) potential.
- Estimated the technical, economic, and achievable potential at the measure level for energy efficiency within the VEDO service territory over the 2018-2023 planning horizon, including annual energy savings.

The analytic approach used in the study is illustrated in Figure ES-1. The MPS analysis process is summarized below and described in detail in Chapter 2 of this report.

¹ A list of acronyms used throughout this report is shown in Chapter 1.

Figure ES-1 Overview of MPS Analysis Approach



Once potential estimates were developed, the second phase of the analysis was to develop the **DSM 2018-2023 Action Plan**. Measure-level savings estimates from the MPS provided a solid foundation from which to develop program potential goals that align with VEDO's near-term implementation accomplishments and budgetary constraints, as well as long-term strategic goals and planning constraints. The program potential goals include adjustments to budget and impact estimates for the measures that fit these criteria. Finally, DSMore was used to perform rigorous cost-effectiveness testing, and the programs determined to be cost-effective are reflected in the Action Plan.

Market Potential Study

Following industry convention, the MPS estimated three tiers of measure-level potential:

- Technical potential is defined as the theoretical upper limit of DSM potential. It assumes that customers adopt all applicable measures regardless of cost or preference.
- Economic potential is also a theoretical upper limit, and includes adoption by all customers of cost-effective measures. For this study, cost-effectiveness is assessed using the total resource cost (TRC) test and the threshold for cost-effectiveness is defined as a TRC ratio greater than or equal to 1.0.
- Achievable potential is a subset of economic potential. As such, it includes only cost-effective measures which customers are actually likely to install. As a result, it must also take into account issues of customer preference and choice.

The measure-level potential estimates provide a forecast of savings **without** consideration of barriers associated with program delivery, measure bundling, and market dynamics. These barriers are considered in the development of the program potential estimates, and the action plan.

Summary of MPS Results

A summary of the MPS results for VEDO, in Figure ES-2, shows annual savings for each level of potential as a percentage of baseline energy use. Over the six-year horizon, technical potential increases from 2% to over 11% of the baseline projection. However, once cost-effectiveness is taken into account, the potential is reduced to only two-thirds of technical potential. Achievable potential is estimated at about 40% of economic potential.

Figure ES-2 Summary of Cumulative Savings across All Sectors (% of Baseline)

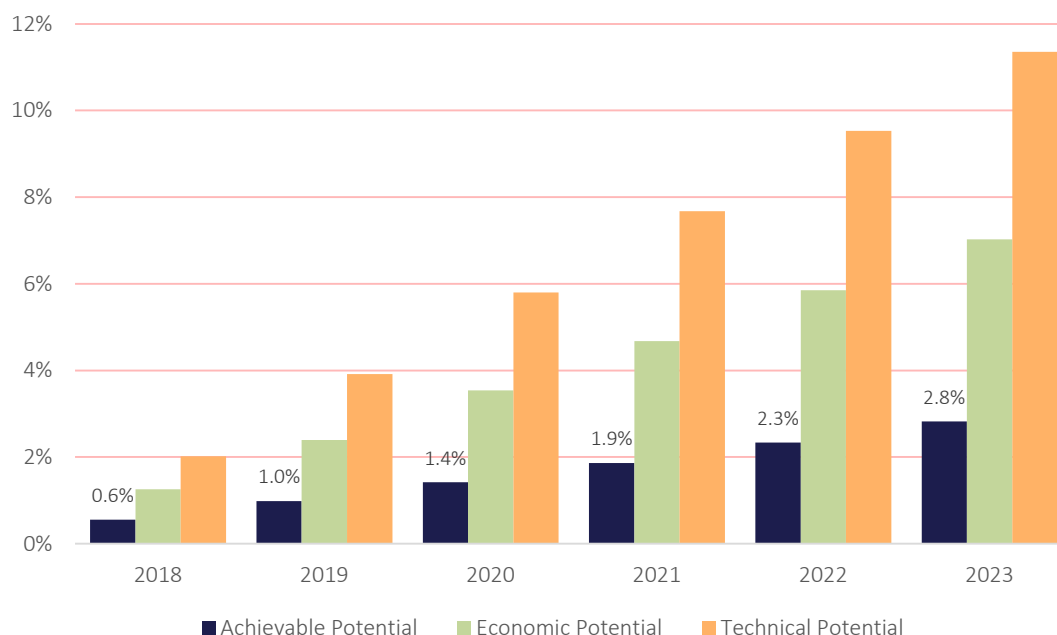


Table ES-1 below shows savings in absolute terms. Over the six-year time horizon, cumulative savings² for achievable potential reach nearly 10,000 thousand Ccf. Average incremental savings³ in the achievable case are about 2,200 thousand Ccf, reflecting the sum of newly-installed measures and the replacement of measures that have reached the end of their useful life and are being replaced.

² **Cumulative** savings refers to the persistent net effects of all measures installed through the reported year. It is derived by subtracting the projected consumption in a potential case, such as the achievable potential, from the baseline projection for that same year.

³ **Incremental** potential is the specific one-year savings attributable to the measures installed or re-purchased in a given year. The model assumes no neither backsliding nor market transformation. Therefore, previously installed measures which expire must be re-acquired and are counted as incremental purchases (the assumption being they would not have occurred in the absence of a utility program). However, as these re-purchased measures were already part of the cumulative savings to this point, they will not contribute additional cumulative potential – they only prevent it from declining. For this reason, cumulative savings are typically less than the sum of incremental savings over a given time period.

Table ES-1 Summary of DSM Potential (Annual Energy, thousand Ccf)

	2018	2019	2020	2021	2022	2023
Baseline Projection (thousand Ccf)	346,909	347,094	347,332	347,661	348,006	348,426
Cumulative Savings (thousand Ccf)						
Achievable Potential	1,916	3,399	4,917	6,479	8,130	9,840
Economic Potential	4,346	8,320	12,281	16,252	20,352	24,489
Technical Potential	6,988	13,581	20,143	26,680	33,161	39,571
Cumulative Savings (% of Baseline)						
Achievable Potential	0.6%	1.0%	1.4%	1.9%	2.3%	2.8%
Economic Potential	1.3%	2.4%	3.5%	4.7%	5.8%	7.0%
Technical Potential	2.0%	3.9%	5.8%	7.7%	9.5%	11.4%
	2018	2019	2020	2021	2022	2023
Incremental Savings (thousand Ccf)						
Achievable Potential	1,916	2,012	2,055	2,114	2,222	2,291
Economic Potential	4,348	4,529	4,551	4,610	4,812	4,887
Technical Potential	6,978	7,186	7,261	7,352	7,435	7,992
Incremental Savings (% of Baseline)						
Achievable Potential	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%
Economic Potential	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%
Technical Potential	2.0%	2.1%	2.1%	2.1%	2.1%	2.3%

Summary of DSM Potential by Sector

The residential sector accounts for the majority of savings for two reasons. First, the residential sector represents 71% of VEDO gas use represented in this study in 2016; the commercial sector accounted for 29% of VEDO gas use. Second, note that the commercial customers in VEDO's service territory are small customers who are less likely to participate in programs than large customers. The analysis does not include customers that have opted out of energy efficiency programs.

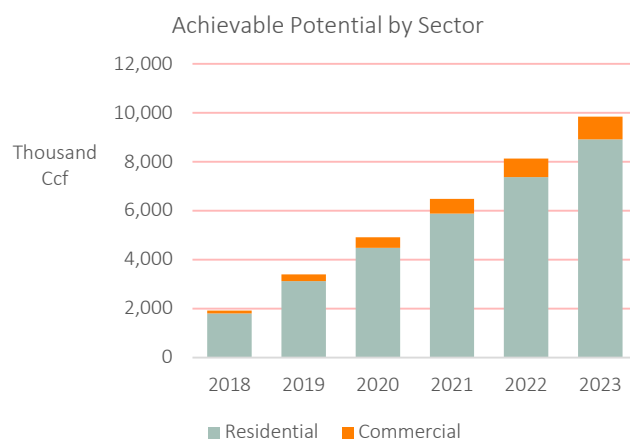


Table ES-2 identifies the **10 residential measures** that have the most individual potential for cumulative savings by 2023.

- The top measure is high-efficiency furnaces, which aligns with the measure's predominance in the energy market profile.
- Wi-Fi-enabled thermostats, both the "learning" model and the "basic" model, have greater savings potential than do traditional programmable thermostats (and rank at 2nd and 3rd place in cumulative savings potential). Both of the internet-connected thermostats have the ability to control the thermostat settings through a Wi-fi connection, but the "learning" thermostats (such as the Nest thermostat) "learn" customers' preferences and adjust the thermostat accordingly.
- Behavioral programs rank as the 4th place measure overall. Though this measure sometimes ranks higher in other utility jurisdictions, the population eligible to participate in such a program is limited due to the need for a control population to verify savings. VEDO provided an estimate that only approximately 50,000 residential households would be able to participate in a behavioral program.
- The fifth-place measure, with 5.1% of the savings, is infiltration control and air sealing. This measure has provided significant savings in the past and this is expected to continue to be an important source of savings going forward.

Table ES-2 Residential Top Measures in 2023

	Measure / Technology	Cumulative Savings (000 Ccf)	% of Total
1	Heating – Furnace AFUE .98	3,203	36.0%
2	Wi-Fi Learning Thermostats	2,196	24.7%
3	Wi-Fi "Basic" Thermostats	683	7.7%
4	Behavioral Programs	514	5.8%
5	Infiltration Control & Air Sealing	457	5.1%
6	1.0 GPM Faucet Aerators	410	4.6%
7	1.6 GPM Low-Flow Showerheads	409	4.6%
8	Insulation - Wall Cavity	268	3.0%
9	Ducting - Repair and Sealing	246	2.8%
10	Furnace - Maintenance	135	1.5%
	Total	8,521	95.7%

Table ES-3 Commercial Sector Top Measures in 2023

	Measure / Technology	Cumulative Savings (000 Ccf)	% of Total
1	Heating – Boiler AFUE .95/.96	228	24.4%
2	Heating – Furnace AFUE .98/.92	137	14.7%
3	Gas Boiler - Hot Water Reset	124	13.2%
4	Heating - Unit Heater	71	7.5%
5	Food Preparation - Fryer	55	5.9%
6	Gas Boiler - Maintenance	38	4.0%
7	Gas Boiler - Stack Damper	37	3.9%
8	HVAC - Occupancy Sensors	34	3.7%
9	Gas Boiler - Combustion Controls	27	2.9%
10	Food Preparation - Griddle	24	2.6%
	Total	775	83.0%

The **top 10 commercial-sector measures**, from the perspective of cumulative natural gas savings in 2023, are shown in Table ES-3. The two measures with the largest savings are high-efficiency boiler replacements and furnace replacements, and these two options account for nearly half the total available estimated savings. As mentioned above, the savings shown here are generally for smaller customers who have, historically, been less likely to participate in programs than have larger customers. Even so, there appears to be significant future energy savings potential in some end uses for this group beyond heating and hot water (in particular in end uses that are relevant to the food service segment).

Program Potential and Action Plan Results

The measure-level achievable potential estimates developed in the study were used to develop program potential savings estimates, as well as detailed cost-effectiveness results to support the development of the action plan. The individual measures identified were allocated and bundled into specific program concepts for the program planning phase of the analysis. This also included developing program delivery strategies, defining plausible incentive levels, and defining administrative infrastructure requirements. A summary of the programs analyzed is shown at the right.

Programs
Residential Prescriptive Rebate Program
Home Insulation and Air Sealing with Direct Install
School Education Program
Home Energy Reports
Vectren Weatherization Program I & II
Commercial Prescriptive Rebate Program
Commercial Custom Program

The summary of savings from the combined portfolio is shown in Table ES-4. Please note:

- The analysis did not include any state or federal incentives for installing energy efficiency measures. Note that, the inclusion of additional incentives would improve the economics for measures installed under any of the relevant programs (particularly for the participating customer).
- The analysis includes VEDO outreach and education costs to educate customers on the overall importance of energy efficiency. There are no savings attributed to these efforts and the costs for this activity are allocated across the entire portfolio of programs.

Table ES-4 VEDO 2018-2023 Plan - Program Incremental Energy Savings

Combined Portfolio*	Number of Participants	Energy Savings (thousand Ccf)	Total Program Budget (\$)
2018	76,681	1,869	\$4,491,178
2019	76,934	1,878	\$4,648,017
2020	77,238	1,887	\$4,808,808
2021	77,512	1,897	\$4,977,575
2022	77,852	1,901	\$5,118,352
2023	78,124	1,903	\$5,256,075
Total	464,342	11,336	\$29,300,006

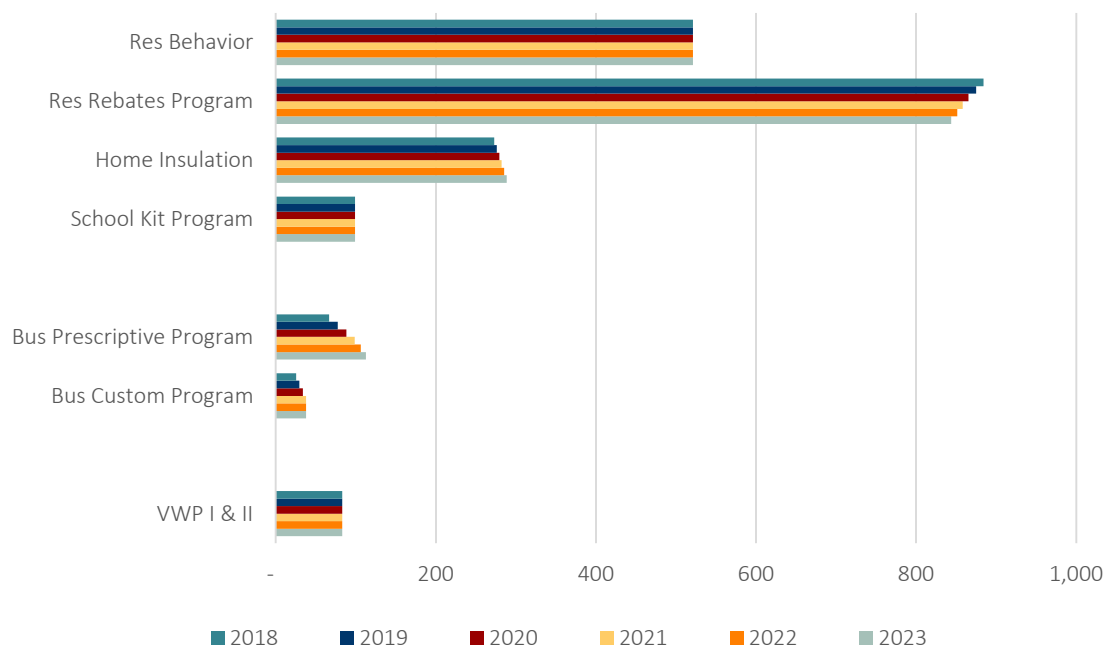
* Excludes Low Income Weatherization Program (VWP)

Incremental savings for each program in the portfolio are shown in Table ES-5 and Figure ES-3. Consistent with previous years, the majority of savings come from the Residential Rebates Program, although savings diminish slightly year over year. Residential Behavior also provides a steady stream of substantial savings. The remaining programs show modest increases in energy savings over the course of the plan.

Table ES-5 VEDO 2018-2023 Plan - Program Incremental Energy Savings (Thousand Ccf)

Programs	2018	2019	2020	2021	2022	2023	Total
Residential Programs							
Behavior	521	521	521	521	521	521	3,127
Rebates Program	884	875	865	858	851	844	5,177
Home Insulation	273	276	279	282	285	289	1,684
School Kit Program	99	99	99	99	99	99	595
<i>Residential Portfolio</i>	<i>1,777</i>	<i>1,771</i>	<i>1,765</i>	<i>1,761</i>	<i>1,757</i>	<i>1,753</i>	<i>10,584</i>
Business Programs							
Prescriptive Program	67	77	88	99	106	113	550
Custom Program	25	29	34	38	38	38	202
<i>Business Portfolio</i>	<i>92</i>	<i>107</i>	<i>122</i>	<i>137</i>	<i>144</i>	<i>151</i>	<i>752</i>
VWP I & II	83	83	83	83	83	83	498
Total Portfolio	1,952	1,961	1,970	1,981	1,984	1,986	11,834

Figure ES-3 Incremental Savings by Program (Thousand Ccf)



Cost-Effectiveness Results

Programs were analyzed using the standard benefit-cost analysis methodology as set by the California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects, California Governor's Office of Planning and Research, 2002. The analysis included a review of all the relevant cost tests, but with a primary focus on the Total Resource Cost Test.

The cost effectiveness results for the VEDO program portfolio are shown below. Each program with savings attributed to it has a benefit-cost ratio greater than 1.0 using each cost-effectiveness test, except the RIM test which is as expected. Across all programs, net benefits over the lifetime of the measures are \$24.0 million dollars, for a TRC benefit-to-cost ratio of 1.73.

Table ES-6 VEDO 2018-2023 Plan Cost Effectiveness Results

	TRC	UTC	RIM	PCT	Lifetime Cost/Ccf	1st Year Cost/Ccf	TRC Net Benefits (\$000)	UCT Net Benefits (\$000)
Business								
Prescriptive Program	2.59	3.01	0.93	3.11	\$0.19	\$3.55	\$2,393	\$2,604
Custom Program	1.23	2.18	0.81	1.42	\$0.31	\$3.67	\$260	\$761
Bus Evaluation	-	-	-	-	\$0.00	\$0.00	(\$97)	(\$97)
Business Portfolio	1.93	2.61	0.88	2.43	\$0.23	\$3.77	\$2,556	\$3,269
Residential								
Behavior	3.37	3.37	0.87	-	\$0.23	\$0.27	\$1,735	\$1,735
Rebates Program	1.74	2.90	1.00	1.38	\$0.21	\$3.97	\$13,185	\$20,345
Home Insulation	2.14	2.63	0.98	2.21	\$0.25	\$4.63	\$7,344	\$8,557
School Kit Program	2.57	2.57	0.93	-	\$0.27	\$3.14	\$2,585	\$2,585
Res Evaluation	-	-	-	-	\$0.00	\$0.00	(\$1,452)	(\$1,452)
Online Audit	-	-	-	-	\$0.00	\$0.00	(\$314)	(\$314)
Ed-Outreach	-	-	-	-	\$0.00	\$0.00	(\$1,593)	(\$1,593)
Residential Portfolio	1.71	2.38	0.92	1.71	\$0.26	\$3.07	\$21,492	\$29,864
Total Portfolio*	1.73	2.40	0.92	1.76	\$0.26	\$3.11	\$24,048	\$33,133

*Excludes Low Income Weatherization Program (VWP)

Conclusions

The total energy savings program potential estimated in Phase 2 of this study is very close to the savings potential identified in Phase 1, the market potential study, as shown in Table ES-7 below. The differences in the savings point to the reality of market timing, program delivery constraints, competition of consumer dollars, measured diffusion of technologies in the marketplace, etc.

Table ES-7 Comparison of Program and Measure-Level Savings (Incremental Thousand Ccf)⁴

Combined Portfolio*	Measure-Level Achievable Potential from MPS	Program Potential from Action Plan*	Program Potential as % of Measure-Level Potential
2018	1,916	1,952	102%
2019	2,012	1,961	97%
2020	2,055	1,970	96%
2021	2,114	1,981	94%
2022	2,222	1,984	89%
2023	2,291	1,986	87%
Combined Total*	12,610	11,834	94%

* Includes VWP Savings

This comparison highlights that the programs outlined in the Action Plan are capturing most of the savings potential available. This shows that Vectren Ohio's programs are on track and do not require major modifications. In addition, a review of program results from other utilities across the country and region suggests the results from the VEDO analysis are in close alignment with other comparable gas utility DSM programs. Vectren should continue pursuing opportunities as they have been doing successfully, while also exploring new options for additional energy savings.

⁴ Note: Combined total may not equal the sum of each individual year due to rounding. This note applies to tables throughout this report.

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1

INTRODUCTION

Background

Vectren Energy Delivery of Ohio (VEDO) provides energy delivery services to approximately 314,000 natural gas customers located in west central Ohio. Vectren attempts to maintain an ongoing focus on the need to conserve natural resources as it provides energy, and energy-related, solutions that make its customers more productive, comfortable and secure.

VEDO's previous Market Potential Study (MPS) and action plan were developed in 2009. Since that time, VEDO has been delivering programs to its customers, refining those programs as needed to address market and partnering opportunities.

Objectives

This market potential study identifies opportunities for future energy conservation and an action plan for achieving those savings. The study focuses only on residential and small commercial (non-transport) customers, since these sectors are the target of VEDO programs. The MPS includes findings from relevant market research, detailed analysis, and results and program recommendations covering the time horizon of 2018-2023. The analysis also includes estimates of energy savings, likely customer participation, and plausible budgets for the residential and commercial sectors, by program and by measure. Specific program designs and a plan for implementing those programs to deliver a cost-effective portfolio were also developed.

Acronyms

Throughout the report, we use several abbreviations and acronyms. This table below shows the abbreviation or acronym and a brief description of what each represents.

Acronym	Explanation
ACS	American Community Survey
AEO	Annual Energy Outlook forecast developed by EIA
AHAM	Association of Home Appliance Manufacturers
B/C Ratio	Benefit to Cost Ratio
BEST	AEG's Building Energy Simulation Tool
CBECS	Commercial Buildings Energy Community Survey by EIA
C&I	Commercial and Industrial
Ccf	Volume of 100 cubic feet of natural gas
DSM	Demand Side Management
DSMore	Cost Benefit Analysis Modeling Tool developed by Integral Analytics
EE	Energy Efficiency
EIA	Energy Information Administration
EUL	Effective Useful Life
EUI	Energy Usage Intensity
HH	Household
HVAC	Heating Ventilation and Air Conditioning
LoadMAP™	AEG's Load Management Analysis and Planning tool
MECS	Manufacturing Energy Consumption Survey by EIA
NPV	Net Present Value
O&M	Operations and Maintenance
OSB	Oversight Board
PCT	Participant Cost Test
RIM	Ratepayer Impact Measure
RECS	Residential Energy Consumption Survey by EIA
TRC	Total Resource Cost test
UCT	Utility Cost Test
UEC	Unit Energy Consumption

2

ANALYSIS APPROACH AND DATA DEVELOPMENT

This section describes the analysis approach taken for the study and the data sources used to develop the potential estimates.

Overview of Analysis Approach for Market Potential Study

To perform the market potential analysis, the AEG team used a bottoms-up approach, following the major steps listed below. We describe these analysis steps in more detail throughout the remainder of this section.

1. Perform a market characterization to describe natural gas use at the residential and commercial sector-level for the base year (2016). This analysis leveraged VEDO data along with other, secondary data sources, such as those available from the Department of Energy's Energy Information Administration (EIA).
2. Develop a baseline projection of natural gas usage by sector, segment, and end use for 2016 through 2028.
3. Define and characterize an array of DSM measures that could be applied to all sectors, segments and end uses.
4. Estimate technical, economic, and achievable energy savings potential at the measure level for all tested DSM measures for the period 2018-2028.
5. Develop program potential and detailed cost-effectiveness results to support the program implementation plan.

LoadMAP Model

For the measure-level DSM analysis, AEG used its Load Management Analysis and Planning tool (LoadMAP™) version 4.0 to develop both the baseline projection and the estimates of energy savings potential. AEG developed LoadMAP in 2007 and has enhanced it over time. Built in Excel, the LoadMAP framework (see Figure 2-1) is both accessible and transparent and has the following key features.

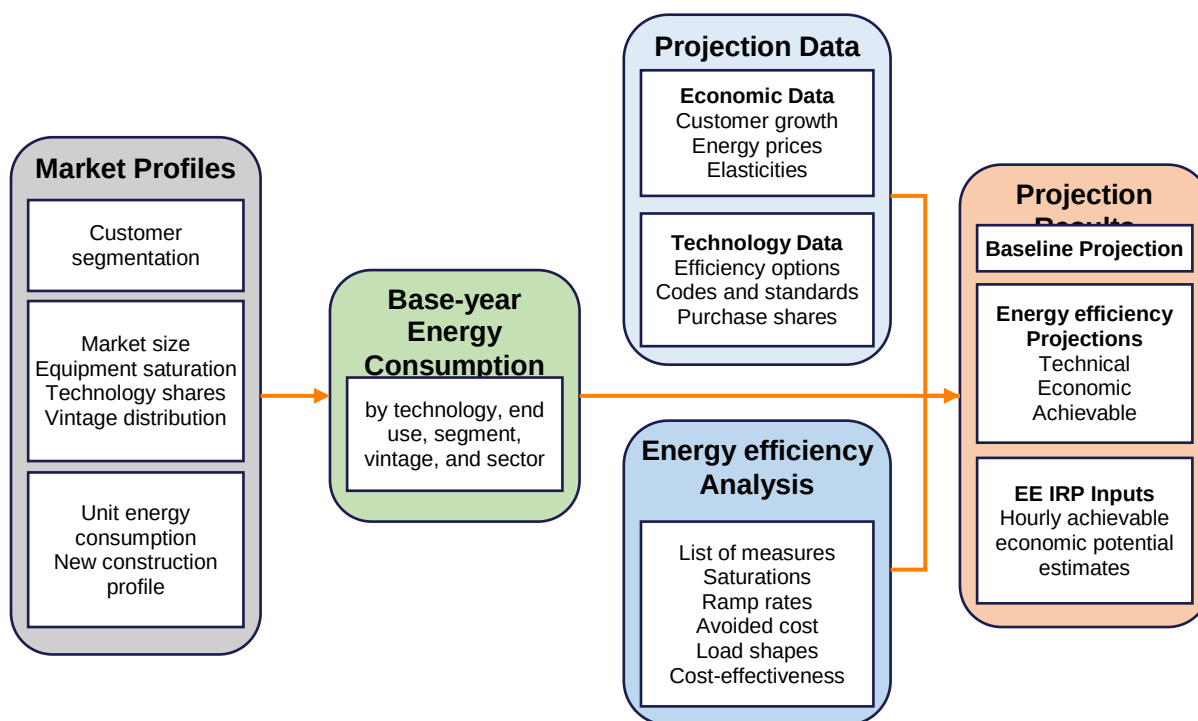
- Embodies the basic principles of rigorous end-use models (such as EPRI's REEPS and COMMEND) but in a more simplified, accessible form.
- Includes stock-accounting algorithms that treat older, less efficient appliance/equipment stock separately from newer, more efficient equipment. Equipment is replaced according to the measure life and appliance vintage distributions defined by the user.
- Balances the competing needs of simplicity and robustness by incorporating important modeling details related to equipment saturations, efficiencies, vintage, and the like, where market data are available, and treats end uses separately to account for varying importance and availability of data resources.
- Isolates new construction from existing equipment and buildings and treats purchase decisions for new construction and existing buildings separately.
- Uses a simple logic for appliance and equipment decisions. Other models available for this purpose embody complex decision choice algorithms or diffusion assumptions, and the model parameters tend to be difficult to estimate or observe and sometimes produce anomalous results that require calibration or even overriding. The LoadMAP approach allows the user to drive the

appliance and equipment choices year by year directly in the model. This flexible approach allows users to import the results from diffusion models or to input individual assumptions. The framework also facilitates sensitivity analysis.

- Includes appliance and equipment models customized by end use. For example, the logic for lighting is distinct from refrigerators and freezers.
- Can accommodate various levels of segmentation. Analysis can be performed at the sector level (e.g., total residential) or for customized segments within sectors (e.g., housing type or income level).
- Analyzes energy efficiency measures, demand-response options, combined heat and power (CHP) and distributed generation options and fuel switching.

Consistent with the segmentation scheme and the market profiles we describe below, the LoadMAP model provides forecasts of baseline energy use by sector, segment, end use, and technology for existing and new buildings. It also provides forecasts of total energy use and energy efficiency savings associated with the various types of potential.⁵

Figure 2-1 LoadMAP Analysis Framework



DSMore Model

For the program potential and cost-effectiveness components of the study, MMP used the DSMore suite of analysis tools. The DSMore tool is award-winning modeling software that is nationally recognized and used in many states across the country to determine cost-effectiveness. Developed and licensed by Integral Analytics, the DSMore cost-effectiveness modeling tool takes hourly prices and hourly energy savings from the specific measures/technologies being considered for the DSM program, and then correlates both to weather. This tool uses more than 30 years of historic weather variability to model expected weather variance appropriately. In turn, this allows the model to capture

⁵ The model computes energy forecasts for each type of potential for each end use as an intermediate calculation. Annual-energy savings are calculated as the difference between the value in the baseline projection and the value in the potential forecast (e.g., the technical potential forecast).

low probability, but high consequence weather events and apply appropriate values to them. This captures a more accurate view of the value of any DSM measure in comparison to other alternative supply options. Inputs into the model include participation rates, incentives paid, energy and demand savings of the measure, life of the measure, implementation costs, administrative costs, and incremental measure costs to the participant. To be consistent with other VEDO planning efforts, DSMore utilizes VEDO provided utility rates; escalation rates; discount rates for the utility, society and the participant; and avoided costs.

Definitions of Potential

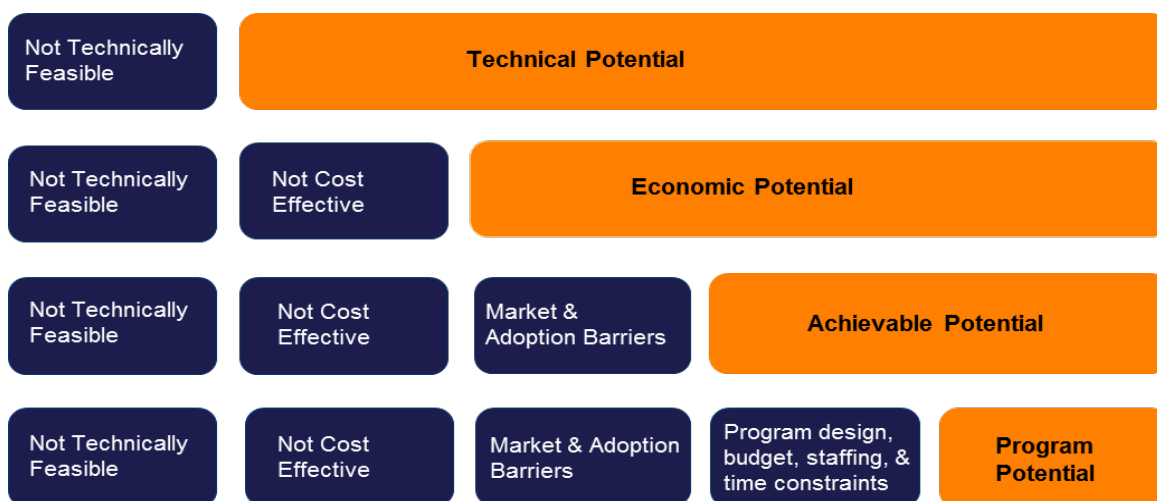
In this study, the savings estimates represent net savings⁶ developed for four types of potential: technical potential, economic potential, achievable and program potential. The first three levels are developed at the measure level. Technical and economic potential are both theoretical limits to efficiency savings. Achievable potential embodies a set of assumptions about the decisions consumers are likely to make regarding the efficiency of the equipment they purchase, the maintenance activities they undertake, the controls they use for energy-consuming equipment, and the elements of building construction. Finally, program potential estimates what is likely to occur through utility programs. The various levels are described in more detail below.

- **Technical potential** is defined as the theoretical upper limit of DSM potential. It assumes that customers adopt all feasible measures regardless of their cost. At the time of appliance or equipment failure, customers are assumed to replace their appliances or equipment with the most efficient option available. In new construction, customers and developers are also assumed to choose the most efficient equipment option. Technical potential is phased in by way of an appliance stock turnover algorithm, which uses the distribution of appliance lifetimes in the existing stock to determine how many appliances are replaced in each year.

Technical potential also assumes the adoption of every other available energy savings measure, where applicable. For example, it includes the installation of high-efficiency windows in all new construction opportunities and furnace maintenance in all existing buildings with furnaces. These measures are also phased in over time according to the complexity and cost of the measure; simple and low-cost measures are phased in more quickly, while complex and more expensive measures are phased in over a longer timeframe.

- **Economic potential** represents the adoption of all **cost-effective** DSM measures. In this analysis, cost-effectiveness is measured by the total resource cost (TRC) test, which compares lifetime energy and capacity benefits to the costs of delivering the measure through a utility program, with incentives not included since they are considered a transfer payment. If the benefits outweigh the costs (that is, if the TRC ratio is equal to or greater than 1.0), a given measure is included in the estimate of economic potential. Customers are then assumed to purchase the most efficient cost-effective option applicable to them at any decision juncture. As with technical potential, cost-effective measures are phased in over time.
- **Achievable potential** refines economic potential by applying customer participation rates that account for market barriers, customer awareness and attitudes, program maturity, and other factors that may affect the actual market penetration of DSM measures over time.
- **Program Potential** considers the way that measure-level, achievable potential energy savings options can be integrated into actual, deliverable, utility programs. Program potential, therefore, includes the subset of measures that can realistically be implemented by VEDO considering alignment with near-term implementation accomplishments and budgetary constraints, as well as long-term strategic goals and planning constraints.

⁶ Savings in "net" terms (instead of "net") mean that the baseline projection includes some naturally occurring efficiency. In other words, the baseline assumes that some customers are already purchasing the more efficient option.

Figure 2-2 *Definition of Levels of Potential*

Market Characterization

The first step in the analysis is to develop the overall market characterization. In order to estimate the savings potential from energy efficient measures, it is first necessary to understand how much energy is used today and what equipment is currently being used. This characterization begins with a segmentation of VEDO's natural gas footprint to quantify energy use by sector, segment, end-use application and the current set of technologies used. Information from VEDO and secondary sources as necessary were used to develop the characterization.

Segmentation for Modeling Purposes

The market assessment first identified the market segments (building types, end uses, and other dimensions) that are relevant in the VEDO service territory. The segmentation scheme for this project is presented in Table 2-1.

Table 2-1 Overview of VEDO Analysis Segmentation Scheme

Dimension	Segmentation Variable	Description
1	Sector	Residential and commercial
2	Segment	Residential: Single family (included duplexes and mobile homes), Multi family, Single Family Low Income and Multifamily Low Income Commercial: Small Office, Large Office, Restaurant, Retail, Grocery, College, School, Health, Lodging, Warehouse, Miscellaneous, & Industrial
3	Vintage	Existing and new construction
4	End uses	Space heating, water heat, motors, etc. (as appropriate by sector)
5	Appliances/end uses and technologies	Technologies relevant for each end use such as furnaces and boilers for space heating
6	Equipment efficiency levels for new purchases	Baseline and higher-efficiency options as appropriate for each technology/measure

With the segmentation scheme defined, the next step was to allocate natural gas sales in the base year to each customer segment. VEDO data and secondary sources were used to allocate energy use and customers to the various sectors and segments such that the total customer count and total energy consumption matched the VEDO system totals from 2016 billing data. This information provided control totals at the segment level that were used to calibrate the LoadMAP model to known data for the base-year.

Market Profiles

The next step was to develop market profiles for each sector, customer segment, end use and technology. A market profile includes the following elements:

- **Market size** is a representation of the number of customers in the segment. For the residential sector, the unit of analysis is the number of households. In the commercial sector, it is floor space measured in square feet.
- **Saturation** identifies the saturation of appliances or equipment and the share of homes using natural gas (e.g., percent of homes with gas furnaces or gas water heating). These were developed using the 2017 Vectren Ohio Residential Gas Appliance Survey results provided by VEDO, as well as Ohio data from the RECS 2009 survey. Where the VEDO survey did not include a particular type of equipment information, other regional data, national data and AEG's other recent studies were used.
- **UEC** (unit energy consumption) or **EUI** (energy-use intensity) describes the amount of gas consumed annually by a single unit or instance of the technology if present in a home or facility. For natural gas, UECs are expressed in Ccf/household for the residential sector, and EUIs are expressed in Ccf/square foot for the commercial sector. Data from EIA's Annual Energy Outlook (AEO), AEG's BEST simulation tool, and AEG's Energy Market Profiles were used to develop these values.
- **Annual energy intensity** for the residential sector represents the average energy use for the technology across all homes in 2016. It is computed as the product of the saturation and the UEC and is defined as Ccf /household for natural gas. For the commercial sector, intensity is

computed as the product of the saturation and the EUI; it represents the average use for the technology across all floor space in 2016.

- **Annual usage** is the amount of energy used annually by an end use technology within a segment. It is calculated by multiplying the market size and intensity and is quantified in million Ccf.

The market characterization results and the market profiles are presented in Section 3.

Baseline Projection

The next step was to develop the baseline projection of annual natural gas use for 2017 through 2028 by customer segment and end use without new utility programs. The end-use projection includes the relatively certain impacts of codes and standards that will unfold over the study timeframe. All such mandates that were defined as of December 2016 are included in the baseline. The baseline projection is the foundation for the analysis of savings from future DSM efforts as well as the metric against which potential savings are measured.

Inputs to the baseline projection include:

- Current economic growth forecasts (i.e., customer growth, income growth)
- Natural gas price forecasts
- Trends in fuel shares and equipment saturations
- Existing and approved changes to building codes and equipment standards

The baseline projection does not include naturally occurring efficiency improvements. We present the baseline projection results for each sector in Chapter 3.

DSM Measure Analysis

The assessment of DSM market potential begins with an initial characterization of relevant DSM measures. This process analyzes the savings, costs, and other attributes of DSM measures. These characteristics serve as the basis for the analysis of measure-level cost effectiveness and savings. For all measures, AEG assembled information to reflect equipment energy use or measure savings,⁷ efficiency, incremental costs, and equipment measure life. This information, along with VEDO's avoided cost data, was used in the economic screen to determine the economic feasibility of all measures.

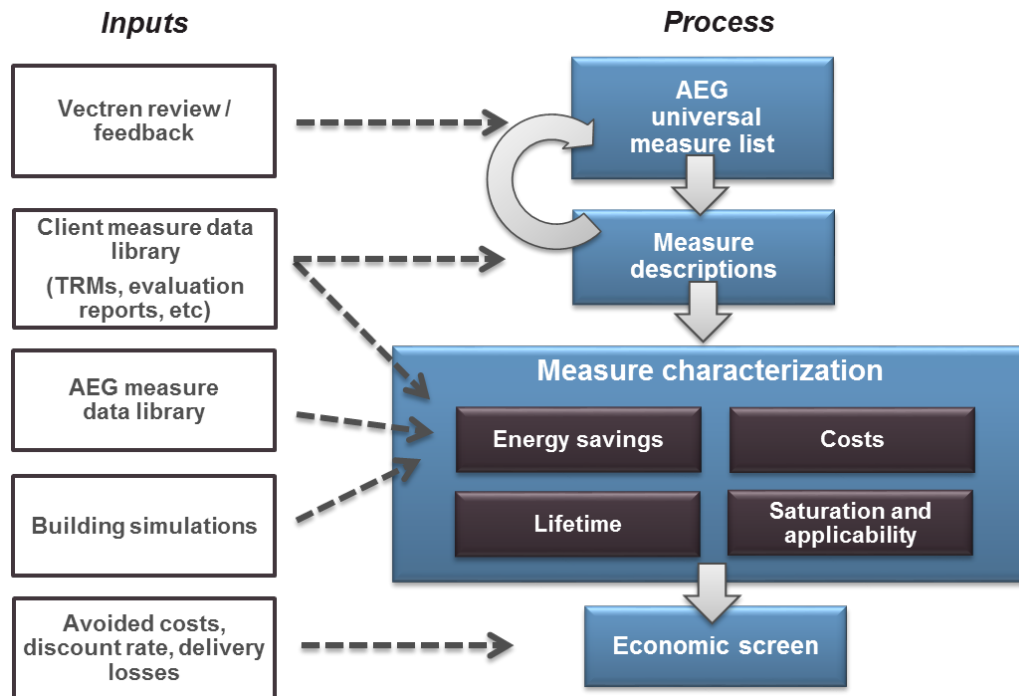
Energy Efficiency Measures

Figure 2-3 depicts the framework for measure analysis. This involves identifying the list of energy efficiency measures to include in the analysis, determining their applicability to each market sector and segment, fully characterizing each measure, and performing the cost-effectiveness screening.

We compiled a robust list of energy efficiency measures for each customer sector, drawing upon VEDO program experience, AEG's own measure databases and building simulation models, and secondary sources. This universal list of EE measures covers all major types of end-use equipment, as well as devices and actions to reduce energy consumption. If considered today, some of these measures would not pass the economic screens initially, but may pass in future years as a result of lower projected equipment costs or higher avoided costs.

⁷ For high-efficiency equipment options, we identify the energy use for each option (see Table 1-2). For energy efficiency measures, we identify the energy savings (see Table 1-3).

Figure 2-3 Approach for Energy Efficiency Measure Assessment



The selected measures are categorized into two types according to the LoadMAP taxonomy: equipment measures and non-equipment measures.

- **Equipment measures** are efficient energy-consuming pieces of equipment that save energy by providing the same service with a lower energy requirement than a standard unit. An example is a high efficiency furnace that replaces a standard efficiency furnace. For equipment measures, many efficiency levels may be available for a given technology, ranging from the baseline unit (often determined by code or standard) up to the most efficient product commercially available. For instance, in the case of boilers, this list begins with the EF 80% unit and goes up to a maximum efficiency of an EF 95% unit.
- **Non-equipment measures** save energy by reducing the need for delivered energy, but do not involve replacement or purchase of major end-use equipment (such as a furnace or a water heater). An example is a programmable thermostat that is pre-set to run heating and cooling systems only when people are home. Non-equipment measures can apply to more than one end use. For instance, the addition of wall insulation will affect the energy use of both space heating and cooling. Non-equipment measures typically fall into one of the following categories:
 - o Building shell (windows, insulation, roofing material)
 - o Equipment controls (thermostat, energy management system)
 - o Equipment maintenance (cleaning filters, changing set points)
 - o Whole-building design (building orientation)
 - o Displacement measures (faucet aerators to reduce use of water heating)
 - o Commissioning and retro-commissioning (initial or ongoing monitoring of building energy systems to optimize energy use)

First, a preliminary list of EE measures was developed and distributed to the VEDO project team for

review. The list was finalized after incorporating comments and is presented in Appendix D to this volume.

Once we assembled the list of EE measures, the project team assessed their energy-saving characteristics. For each measure, incremental cost, service life and other performance factors were also characterized. Following the measure characterization, we performed an economic screening of each measure, which serves as the basis for developing the estimates of economic and achievable potential.

Representative EE Measure Data Inputs

To provide an example of energy efficiency measure-level data, Table 2-2 and Table 2-3 present examples of the detailed data inputs behind both equipment and non-equipment measures that are relevant to residential furnaces in single-family homes. Table 2-2 displays the various efficiency levels available, as well as the corresponding useful life, energy usage, and cost estimates. The columns labeled On Market and Off Market reflect equipment availability due to codes and standards or the entry of new products to market.

Table 2-2 *Example Equipment Measures for Boiler – Single Family, Existing Home*

Efficiency Level	Useful Life	Equipment Cost	Energy Usage (Ccf /yr)	On Market	Off Market
AFUE 0.82	18	\$3,774.91	629.99	2016	2028
AFUE 0.85	18	\$3,855.49	607.75	2016	2028
AFUE 0.90	18	\$3,855.49	573.99	2016	2028
AFUE 0.96	18	\$4,025.70	538.12	2016	2028
Absorption Heat Pump	15	\$4,496.70	368.99	2024	2028

Table 2-3 lists some of the non-equipment measures applicable to space heating in an existing single-family home. All measures are evaluated for cost-effectiveness based on the lifetime benefits relative to the cost of the measure. The total savings and costs are calculated for each year of the study and depend on the base year saturation of the measure, the applicability of the measure, and the potential savings possible as a percentage of the relevant energy end uses.

Table 2-3 *Example Non-Equipment Measures – Single Family, Existing, Space Heat*

Measure	Saturation in 2016 ⁸	Applicability	Lifetime (yrs)	Measure Installed Cost	Energy Savings (%)
Insulation – Ceiling	43%	75%	25	\$826	3%
Ducting - Repair and Sealing	47%	60%	20	\$560	22%
Furnace Maintenance	7%	75%	5	\$146	5%

Screening Measures for Cost-Effectiveness

Only measures that are cost-effective are included in the estimates of economic and achievable potential. Therefore, for each individual measure, LoadMAP performs an economic screen. This study uses the TRC test that compares the lifetime energy benefits of each applicable measure with its cost. The lifetime benefits are calculated by multiplying the annual energy and demand savings associated with each measure by all appropriate avoided costs for each year, and discounting the dollar savings to the present-day value equivalent. Lifetime costs account for incremental measure cost and annual O&M costs. The analysis uses each measure's values for savings, costs, and lifetime costs that were developed as part of the measure characterization process described above.

The LoadMAP model performs this screening dynamically, considering changing savings and cost data over time. Thus, some measures may pass the economic screen for some — but not all — of the years in the forecast.

It is important to note the following about the economic measure screening:

- The economic evaluation of every measure in the screen is conducted relative to a baseline condition. So, for instance, to determine the Ccf savings potential of any given measure, the Ccf consumption of the end use with the energy efficiency measure applied must be compared to the Ccf consumption associated with that end use in the baseline condition.
- The economic screening was conducted only for measures that are applicable to each building type and vintage; ergo if a measure is deemed to be irrelevant to a given building type and vintage, it is excluded from the respective economic screen.

Table 2-4 summarizes the number of measures evaluated for each segment within each sector.

Table 2-4 *Number of Measures Evaluated*

Sector	Total Measures	Measure Permutations w/ 2 Vintages	Measure Permutations w/ All Segments
Residential	32	64	128
Commercial	40	80	960
Total Measures Evaluated	72	144	1,088

⁸ Note that saturation levels reflected for the base year change over time as more measures are adopted.

Measure-Level DSM Potential

The approach used to calculate the DSM potential in this study adheres to the approaches and conventions outlined in the National Action Plan for Energy Efficiency (NAPEE) Guide for Conducting Potential Studies (November 2007).⁹ The NAPEE Guide represents the most credible and comprehensive industry practice for specifying DSM potential.

The three types of measure-level potential were calculated as follows:

- For technical potential, all customers choose the most efficient option available at the time, regardless of cost, to replace their failed equipment. For example, referring to Table 2-2, all residential customers with boilers replace failed units with an AFUE 0.96 unit between 2018 and 2023. Thereafter, they replace their boilers with an absorption heat pump. Customers also install all applicable non-equipment measures, regardless of cost, according to the phase-in schedule for each measure. For example, every customer with inefficient windows replaces them with the most efficient windows available on the market.
- For economic potential, all customers choose the most efficient, cost-effective option available at the time to replace failed equipment. This study used the Total Resource Cost (TRC) ratio as the basis for cost effectiveness, which compares the net lifetime value of avoided energy costs to the incremental cost of the higher efficiency equipment or measure installation. Again, referring to Table 2-2, all customers in this scenario install AFUE .96 boilers from 2018-2023, because the net present value of the 92 annual Ccf saved for 18 years is greater than the incremental cost of \$251. Thereafter, customers install absorption heat pumps, again because the value of the savings outweighs the incremental cost. Customers also install all applicable non-equipment measures where the net present value of lifetime savings is greater than the incremental cost of the retrofit or installation, as applicable.
- To develop estimates for achievable potential, market adoption rates were defined for each measure that specify the percentage of customers that will actually select and install the highest-efficiency economic option. A variety of secondary sources, as well as past program history from VEDO, were used to develop these participation rates. Continuing the example above, program history and consumer surveys in the region suggest that only 37% of eligible customers are defined as likely to respond to VEDO incentives and purchase the high efficiency boiler than would do so under the baseline model. Therefore, achievable potential for boilers is only 37% of the economic potential for this end use. The study assumes that adoption factors rise by 0.5% per year during the study period, representing increased customer awareness and utility outreach.

Table 2-5 shows the adoption rates and differences between technical, economic, and achievable potential for a small subset of residential measures.

⁹ National Action Plan for Energy Efficiency (2007). *National Action Plan for Energy Efficiency Vision for 2025: Developing a Framework for Change*. www.epa.gov/eeactionplan.

Table 2-5 *Example Potential Levels for Selected Residential Measures (Single Family, Existing, 2018)*

Measure	Technical Potential (Ccf)	TRC Ratio	Economic Potential (Ccf)	Measure Adoption Rate	Achievable Potential (Ccf)
Furnace: AFUE .98	339,398	1.15	339,398	38%	129,943
Boiler: AFUE .96	4,132	4.08	4,132	38%	1,582
Insulation – Ceiling: R-38 Upgrade	38,149	0.25	0	30%	0
Thermostat – Wi-Fi Enabled “Smart”	148,072	1.51	148,072	38%	57,173
Building Shell: Infiltration Control	354,317	5.43	354,317	16%	55,382

The measure-level potential results are presented in Chapter 4.

Program-Level DSM Potential

The market potential study provided a fact-based and transparent foundation for the development of the VEDO DSM action plan. Measure-level savings estimates were used as a basis to develop program potential estimates which align with VEDO’s near-term implementation accomplishments and budgetary constraints, as well as long-term strategic goals and planning constraints. The program potential estimates include adjustments to budget and impact estimates for the measures that fit these criteria. The final budgets and impacts were run through a rigorous cost-effectiveness analysis using the DSMore tool to finalize the cost-effective program savings potential and the Action Plan.

Data Development

This section details the data sources used in this study, followed by a discussion of how these sources were applied. In general, data were adapted to local conditions, for example, by using local sources for measure data and local weather for building simulations.

Data Sources

The data sources are organized into the following categories:

- VEDO data
- AEG’s databases and analysis tools
- Other secondary data and reports

VEDO Data

The highest-priority data sources for this study were those specific to VEDO.

- **VEDO customer data:** VEDO provided billing data for development of customer counts and energy use for each sector.
- **Load forecasts:** VEDO provided an economic growth forecast by sector; natural gas load forecast; and retail natural gas price history and forecasts.
- **Economic information:** VEDO provided avoided cost forecasts, a discount rate, and line loss factor.
- **VEDO program data:** VEDO provided information about past and current programs, including

program descriptions, goals, and achievements to date.

- **VEDO reports and research:** VEDO provided previous studies and evaluations conducted, including the 2017 VEDO Residential Appliance Saturation Survey results.

AEG Data

AEG maintains several databases and modeling tools that we use for forecasting and potential studies. Relevant data from these tools has been incorporated into the analysis and deliverables for this study.

- **AEG Energy Market Profiles:** For more than 10 years, AEG staff have maintained profiles of end-use consumption for the residential, commercial and industrial sectors. These profiles include market size, fuel shares, unit consumption estimates, and annual energy use by fuel (natural gas and electricity), customer segment and end use for 10 regions in the U.S. The Energy Information Administration surveys (RECS, CBECS and MECS) as well as state-level statistics and local customer research provide the foundation for these regional profiles.
- **Building Energy Simulation Tool (BEST).** AEG's BEST is a derivative of the DOE 2.2 building simulation model, used to estimate base-year UECs and EUIs, as well as measure savings for the HVAC-related measures.
- **AEG's Database of Energy Efficiency Measures (DEEM):** AEG maintains an extensive database of measure data for our studies. Our database draws upon reliable sources including the California Database for Energy Efficient Resources (DEER), the EIA Technology Forecast Updates – Residential and Commercial Building Technologies – Reference Case, RS Means cost data, and Grainger Catalog Cost data.
- **Recent studies.** AEG has conducted dozens of studies of EE potential in the last five years, including a study for Vectren Energy Delivery of Indiana (VEDO) completed in 2015. Input assumptions and analysis results are compared internally against the results from these other studies, which include Ameren Illinois, Citizens Energy Board, Consolidated Edison of New York, Avista Utilities, and the State of New Jersey, in addition to the previously mentioned VEDO study.

Other Secondary Data and Reports

Finally, a variety of secondary data sources and reports were used for this study. The main sources are identified below.

- **Annual Energy Outlook.** The Annual Energy Outlook (AEO), conducted each year by the U.S. Energy Information Administration (EIA), presents yearly projections and analysis of energy topics. For this study, we used data from the 2015 AEO.
- **American Community Survey:** The US Census American Community Survey is an ongoing survey that provides data every year on household characteristics. Data for VEDO's territory were available for this study. <http://www.census.gov/acs/www/>
- **Local Weather Data:** Weather from NOAA's National Climatic Data Center for Dayton, Ohio was used as the basis for building simulations.
- **Indiana Statewide Data:** As Ohio does not have a fully developed TRM of its own, data was accessed from the Indiana Technical Reference Manual, and statewide residential and commercial baseline studies.
- **Database for Energy Efficient Resources (DEER).** The California Energy Commission and California Public Utilities Commission (CPUC) sponsor this database, which is designed to provide well-documented estimates of energy savings values, measure costs, and effective useful life (EUL) for the state of California. We used the DEER database to cross check the measure savings we developed using BEST and DEEM.

- **EPRI End-Use Models (REEPS and COMMEND).** These models provide the elasticities we apply to natural gas prices, household income, and annual heating-degree days (HDD).
- **Other relevant regional sources:** These include reports from the Consortium for Energy Efficiency, the EPA, and the American Council for an Energy Efficient Economy, and the Illinois statewide TRM

Application of Data to the Analysis

We now discuss how the data sources described above were used for each step of the study.

Data Application for Market Characterization

To construct the high-level market characterization of natural gas use and households/floor space for the residential and commercial sectors, VEDO billing data and customer surveys were used to estimate energy use.

Data Application for Market Profiles

To develop the market profiles for each segment, the following approach was used:

1. Developed control totals for each segment. These include market size, segment-level annual natural gas use, and annual intensity.
2. Used the 2017 VEDO Residential Appliance Saturation Survey, RECS 2012, EIA's American Housing Survey and AEG's Energy Market Profiles database to develop existing appliance saturations, appliance and equipment characteristics, and building characteristics.
3. Ensured calibration to control totals for annual natural gas sales in each sector and segment.
4. Compared and cross-checked with other recent AEG studies.
5. Worked with VEDO staff to vet the data against their knowledge and experience.

Data Application for Baseline Projection

Table 2-6 summarizes the LoadMAP model inputs required for the baseline projection. These inputs are required for each segment within each sector, as well as for new construction and existing dwellings/buildings.

Table 2-6 Data Applied for the Market Profiles

Model Inputs	Description	Key Sources
Market size	Base-year residential dwellings, commercial floor space, and industrial employment	VEDO billing data VEDO Load Forecasting AEO 2015
Annual intensity	Residential: Annual use per household Commercial: Annual use per square foot Industrial: Annual use per employee	AEG's Energy Market Profiles AEO 2015 Other recent studies
Appliance/equipment saturations	Fraction of dwellings with an appliance/technology Percentage of C&I floor space/employment with equipment/technology	American Community Survey AEG's Energy Market Profiles VEDO Load Forecasting VEDO's 2017 Appliance Saturation Study

UEC/EUI for each end-use technology	UEC: Annual natural gas use in homes and buildings that have the technology EUI: Annual natural gas use per square foot/employee for a technology in floor space that has the technology	HVAC uses: BEST simulations using prototypes developed for VEDO Engineering analysis DEEM Recent AEG studies Indiana TRM
Appliance/equipment age distribution	Age distribution for each technology	Recent AEG studies
Efficiency options for each technology	List of available efficiency options and annual energy use for each technology	AEG DEEM AEO 2015 DEER NWPCC workbooks, RTF Previous studies Indiana TRM Illinois TRM

Table 2-7 *Data Needs for the Baseline Projection and Potentials Estimation in LoadMAP*

Model Inputs	Description	Key Sources
Customer growth forecasts	Forecasts of new construction in residential and C&I sectors	VEDO load forecast AEO 2015 economic growth forecast
Equipment purchase shares for baseline projection	For each equipment/technology, purchase shares for each efficiency level; specified separately for existing equipment replacement and new construction	Shipments data from AEO AEO 2015 regional forecast assumptions ¹⁰ Appliance/efficiency standards analysis VEDO program results and evaluation reports
Natural gas prices	Forecast of average energy and capacity avoided costs and retail prices	VEDO forecast
Utilization elasticities	Elasticities for gas prices, household income, and HDD	EPRI's REEPS and COMMEND models, and AEO 2015

In addition, assumptions for known future equipment standards as of December 2016, as shown for the residential sector in Table 2-8, were implemented. The assumptions tables here extend through 2025, after which all standards are assumed to hold steady. Note that the date of implementation for a new standard which would apply to residential furnaces is uncertain. A standard of AFUE 90% was recently proposed for the northern region (in which Ohio is included), but comments were submitted by industry parties that led to the standard being suspended for further review. Based on the best information available at this time, VEDO projects, for the purposes of this study, that a standard of AFUE 90% will be enacted in 2021. The language of the proposed ruling sets its effective date at 3 years after passage, so the baseline change occurs at 2024 in the model.

For the commercial sector, there are no notable standard changes within the study's time horizon. However, we did model the residential furnace standard in the commercial sector for small business applications where a residential-sized unit is used in a commercial building.

¹⁰ We developed baseline purchase decisions using the Energy Information Agency's *Annual Energy Outlook* report (2015), which utilizes the National Energy Modeling System (NEMS) to produce a self-consistent supply and demand economic model. We calibrated equipment purchase options to match manufacturer shipment data for recent years and then held values constant for the study period. This removes any effects of naturally occurring conservation or effects of future DSM programs that may be embedded in the AEO forecasts.

Table 2-8 Residential Natural Gas Equipment Standards

End Use	Technology	Baseline Efficiency
Space Heating	Furnace	AFUE .80
	Boiler	AFUE 82
Water Heating	Water Heater <= 55 gal	EF .62
	Water Heater > 55 gal	EF .75/Condensing
Appliances	Clothes Dryer	EF 3.30
	Range/Oven	EF .399
Miscellaneous	Pool Heater	EF .82

DSM Measure Data Application

Table 2-9 details the energy efficiency data inputs to the LoadMAP model. It describes each input and identifies the key sources used in the VEDO analysis.

Table 2-9 Model Inputs for Potentials Estimation in LoadMAP

Model Inputs	Description	Key Sources
Energy Impacts	The annual reduction in consumption attributable to each specific measure. Savings were developed as a percentage of the energy end use that the measure affects.	Indiana TRM Illinois TRM BEST AEG DEEM AEO 2015 Other secondary sources
Costs	Equipment Measures: Includes the full cost of purchasing and installing the equipment on a per-household, per-square-foot, or per employee basis for the residential, commercial, and industrial sectors, respectively. Non-equipment measures: Existing buildings – full installed cost. New Construction - the costs may be either the full cost of the measure, or as appropriate, it may be the incremental cost of upgrading from a standard level to a higher efficiency level.	Indiana TRM Illinois TRM AEG DEEM AEO 2015 DEER NWPCC workbooks, RTF RS Means Other secondary sources
Measure Lifetimes	Estimates derived from the technical data and secondary data sources that support the measure demand and energy savings analysis.	Indiana TRM Illinois TRM AEG DEEM AEO 2015 DEER NWPCC workbooks, RTF Other secondary sources

Applicability	Estimate of the percentage of dwellings in the residential sector, square feet in the commercial sector, or employees in the industrial sector where the measure is applicable and where it is technically feasible to implement.	Indiana TRM Illinois TRM AEG DEEM DEER NWPCC workbooks, RTF Other secondary sources
On Market and Off Market Availability	Expressed as years for equipment measures to reflect when the equipment technology is available or no longer available in the market.	AEG appliance standards and building codes analysis

Data Application for Cost-effectiveness Screening

To perform the cost-effectiveness screening, several economic assumptions were needed. All cost and benefit values were analyzed as real 2016 dollars and a discount rate of 8.89% was used. All impacts in this report are presented at the customer meter, but natural gas energy delivery losses of 1.4% were used to translate impacts to the system level for economic analysis.

Achievable Potential Estimation

To estimate achievable potential, two sets of parameters are needed to represent customer decision making behavior with respect to energy efficiency choices.

- **Technical diffusion curves for non-equipment measures.** Equipment measures are installed when existing units fail. Non-equipment measures do not have this natural periodicity, so rather than installing all available non-equipment measures in the first year of the projection (i.e., instantaneous potential), they are phased-in according to adoption schedules that generally align with the diffusion of similar equipment measures. These adoption rates are used within LoadMAP to generate the technical and economic potentials for non-equipment measures.
- **Achievable adoption rates.** Customer adoption rates, or take rates, are applied to economic potential to estimate achievable potential. These rates represent customer adoption of economic measures when delivered through a best-practice portfolio of well-operated efficiency programs under a reasonable policy or regulatory framework. Information channels are assumed to be established and efficient for marketing to, and educating, consumers, and coordinating with trade allies and delivery partners. The primary barriers to adoption reflected in this case are customer preferences. These adoption rates are calibrated in the near term to align with VEDO's recent program accomplishments and are assumed to increase over time. The achievable adoption rates are presented in Appendix B.

3

MARKET CHARACTERIZATION AND MARKET PROFILES

Market characterization analyses and market profiles are used to describe how customers in the VEDO service territory use natural gas in the base year of the study, 2016. The presentation of results below begins with a high-level summary of energy use across all sectors and then delves into each sector in more detail.

Energy Use Summary

Total natural gas use for the residential and commercial sectors for VEDO in 2016 was 299 million Ccf.¹¹ The residential sector used 214 million Ccf in 2016 (71%) and the commercial sector used 86 million Ccf (29%).

Residential Sector

The total number of households and natural gas sales for the service territory were obtained from VEDO's customer database. In 2016, there were 292,063 households in the VEDO territory that used a total of 213.6 million Ccf of natural gas. Data from VEDO's latest appliance saturation survey was used to separate customers by housing type. The values are shown in Table 3-1 below, and referred to throughout the study as control totals to which all energy usage is calibrated in the base year of the study.

Table 3-1 Residential Sector Control Totals (2016)

Residential	Number of Households	2016 Gas Use (million Ccf/yr)	Avg. Use per Household (Ccf/yr)
Single Family	150,506	120.3	799
Multifamily	26,847	15.6	583
Single Family Low Income	84,609	62.3	737
Multi Family Low Income	30,101	15.3	509
Total	292,063	213.6	731

Energy Market Profile

As we describe in the previous section, market profiles provide the foundation for development of the baseline projection and the energy savings potential estimates. The average market profile for the residential sector is presented in Table 3-2. Segment-specific market profiles are presented in Appendix A.

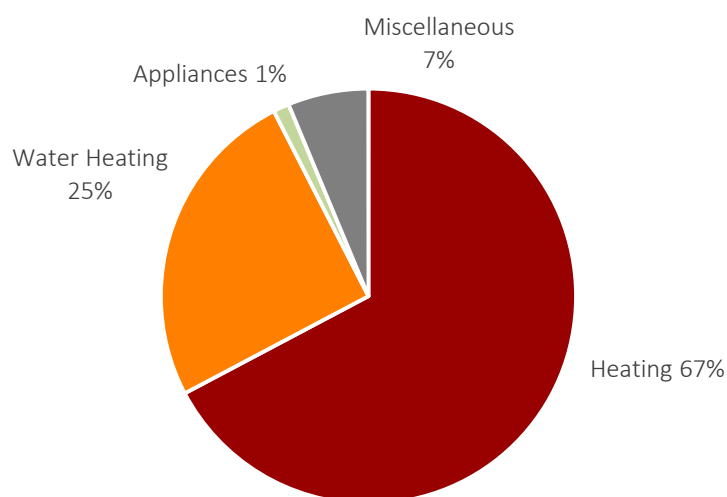
¹¹ Total does not include transport customers

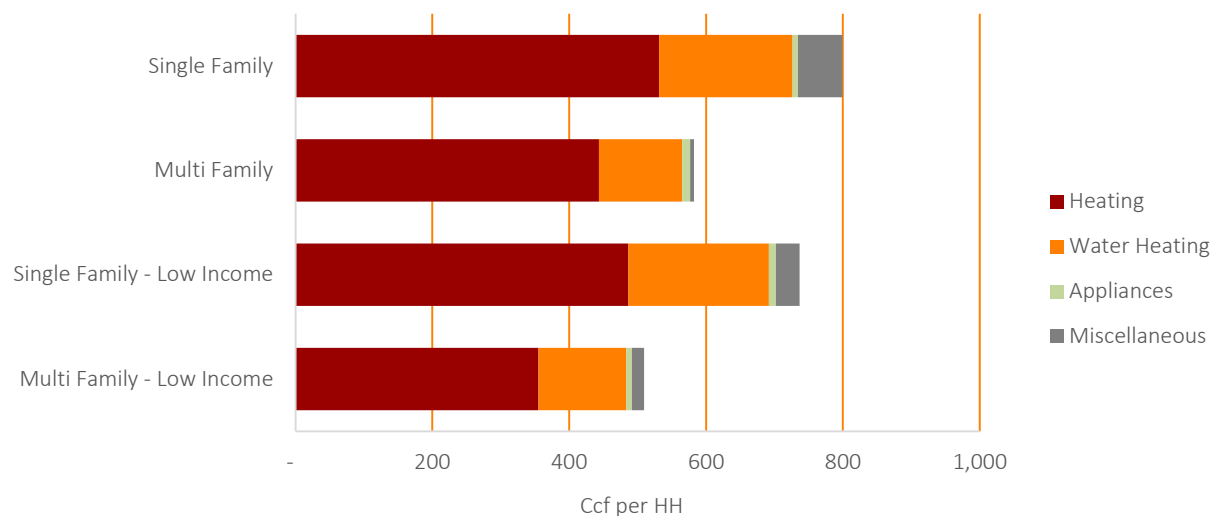
Table 3-2 *Average Market Profile for the Residential Sector, 2016*

End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)	Usage (million Ccf)	HH with Technology
Space Heating	Furnace	81.8%	590	482	140.9	238,969
Space Heating	Boiler	1.6%	592	9	2.8	4,666
Water Heating	Water Heater <= 55 gal	64.5%	230	148	43.3	188,464
Water Heating	Water Heater > 55 gal	14.7%	245	36	10.5	42,978
Appliances	Clothes Dryer	7.0%	26	2	0.5	20,501
Appliances	Stove/Oven	13.1%	55	7	2.1	38,237
Miscellaneous	Gas Fireplace	10.7%	414	44	13.0	31,352
Miscellaneous	Pool Heater	0.6%	220	1	0.4	1,627
Miscellaneous	Miscellaneous	100.0%	0	0	0.1	292,063
Total				731.3	213.6	

Figure 3-1 shows the distribution of annual natural gas use by end use for all residential customers. The primary natural gas end use —space heating — accounts for 67% of total use. Most of the remaining gas energy use falls is accounted for by water heating (25%).

Figure 3-2 presents the natural gas intensities by end use and housing type. Single-family homes have the highest use per customer at 799 Ccf per household (Annual Ccf/HH), which reflects their larger size and increased heating requirements.

Figure 3-1 *Residential Natural Gas Use (2016)***Figure 3-2** *Residential Energy Intensity by End use and Segment (Annual Ccf/HH, 2016)*



Commercial Sector

The total amount of natural gas consumed by commercial customers in VEDO's service area in 2016 was 85.9 million Ccf. VEDO billing data, forecast results, and secondary data were used to allocate total gas use to segments, which included the 11 commercial segments shown in Table 3-3 below plus one more segment to represent customers with substantial process heat usage. Sales data were allocated based on NAICS codes and visual inspection of individual accounts and then used to develop estimates of usage by building type for 2016. Intensities in Ccf per square foot were developed using AEG's Energy Market Profiles database for the region, as well as the VEDO commercial survey. Sales and intensity are used to develop an estimate of floor space for each building type because floor space is the unit of analysis for the commercial sector in LoadMAP. The values are shown in Table 3-3.

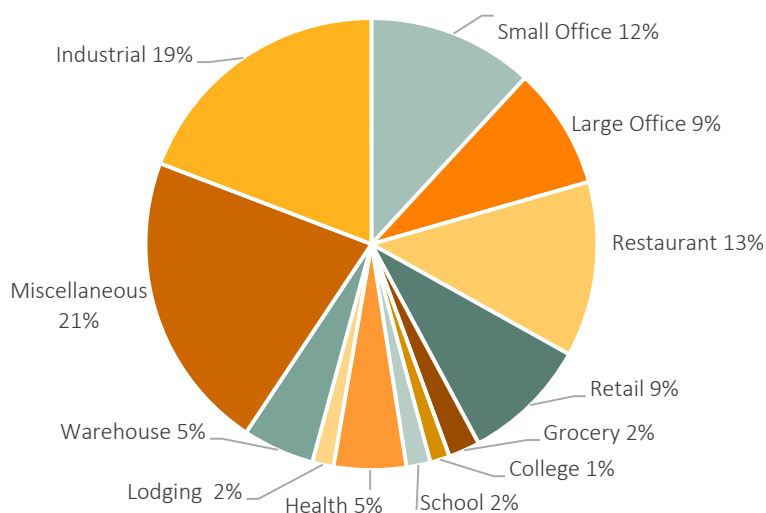
Figure 3-3 shows the distribution of annual natural gas consumption by segment across all commercial buildings. Natural gas usage is dominated by miscellaneous customers (21%), industrial facilities (19%), restaurants (13%), and small offices (12%).

Table 3-3 Commercial Sector Control Totals (2016)

Segment	Gas Sales (million Ccf)	% of Total Usage	Avg Intensity (Ccf/SqFt)	Floor Space (Million Sq.Ft.)
Small Office	10.2	12%	0.45	22.5
Large Office	7.5	9%	0.32	23.7
Restaurant	10.8	13%	2.04	5.3
Retail	7.8	9%	0.54	14.4
Grocery	1.9	2%	0.55	3.5
School	1.5	2%	0.43	3.4
College	1.2	1%	0.49	2.5
Lodging	1.3	2%	0.53	2.4
Warehouse	4.4	5%	0.33	13.5

Miscellaneous	18.4	21%	0.85	21.8
Health	4.5	5%	1.34	3.3
Industrial	16.5	19%	1.20	13.7
Total	85.9	100%	0.66	130.1

Figure 3-3 Commercial Sector Natural Gas Consumption by Segment (2016)



Energy Market Profiles

Table 3-4 shows the average market profile for the commercial sector as a whole, representing a composite of all segments and buildings. Market profiles for each segment are presented in Appendix A.

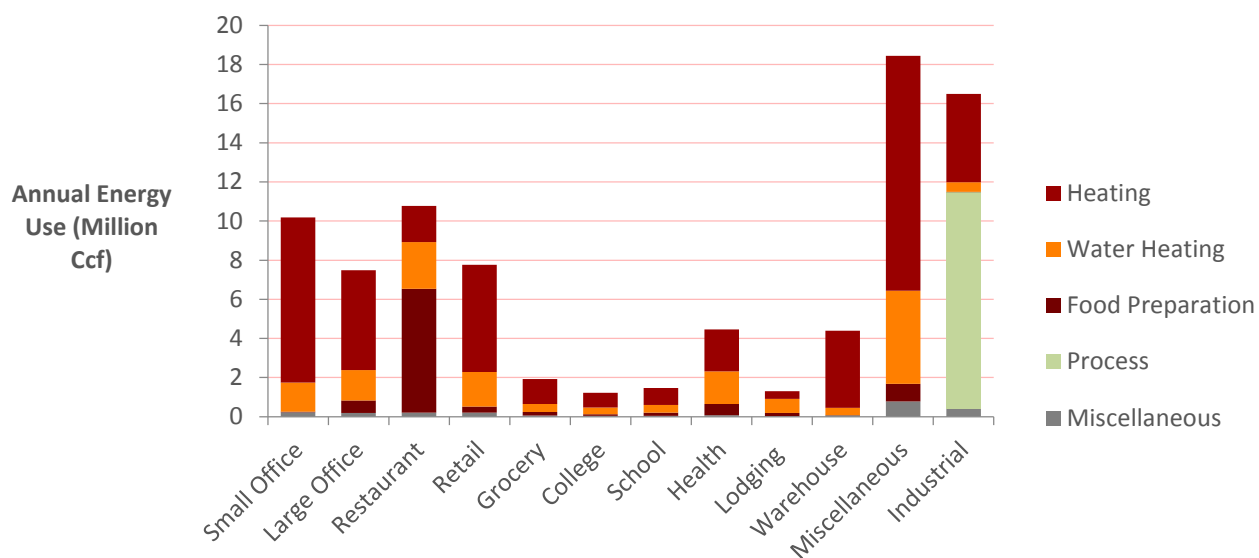
Table 3-4 Average Market Profile for the Commercial Sector, 2016

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/Sqft)	Usage (Million Ccf)
Heating	Furnace	52.0%	0.33	0.17	22.5
Heating	Boiler	30.9%	0.53	0.16	21.4
Heating	Other Heating	7.0%	0.31	0.02	2.8
Water Heating	Water Heater	66.4%	0.19	0.13	16.4
Food Preparation	Oven	14.7%	0.06	0.01	1.1
Food Preparation	Fryer	11.7%	0.21	0.02	3.2
Food Preparation	Broiler	7.6%	0.26	0.02	2.6
Food Preparation	Griddle	13.5%	0.13	0.02	2.3
Food Preparation	Steamer	1.0%	0.14	0.00	0.2
Process	Process Heating	10.5%	0.81	0.08	11.1
Miscellaneous	Pool Heater	0.4%	0.01	0.00	0.0

Miscellaneous	Other Miscellaneous	100.0%	0.02	0.02	2.4
Total				0.66	85.9

Figure 3-4 presents the natural gas usage in million Ccf by end use and segment. Space heating and water heating are the major end uses across most segments, except for Industrial segment, where process heating is the dominant end use.

Figure 3-4 Commercial Natural Gas Usage by End Use and Segment (million Ccf, 2016)



4

BASELINE PROJECTION

Prior to developing estimates of energy efficiency potential, a baseline end-use projection was developed to quantify what natural gas consumption is likely to be in the future in the absence of any energy efficiency programs. The savings from past energy efficiency programs are embedded in the forecast, but the baseline projection assumes that those past programs cease to exist in the future. Possible energy savings from future programs are captured by the potential estimates.

The baseline projection incorporates assumptions about:

- Customer and economic growth
- Appliance/equipment standards and building codes already mandated (see Section 2)
- Forecasts of future natural gas prices and other drivers of consumption
- Trends in fuel shares and appliance saturations and assumptions about miscellaneous natural gas growth

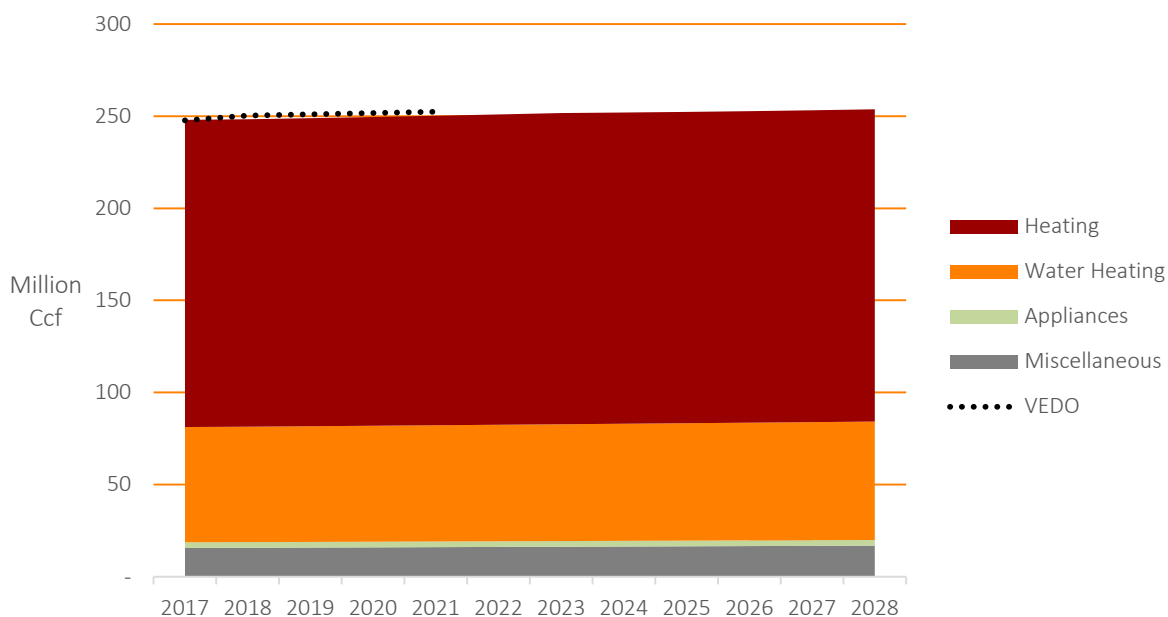
The baseline projection accounts for “naturally occurring” energy efficiency improvements, meaning that potential energy savings are measured in addition to (or “net of”) these naturally occurring improvements. Although it aligns closely, the baseline projection is not exactly the same as VEDO’s official load forecast. Rather it was developed to serve as the metric against which DSM energy savings potentials are measured. Below, we present the baseline projections for each sector, which include projections of annual use in million Ccf. We also present a summary of these projections across all sectors.

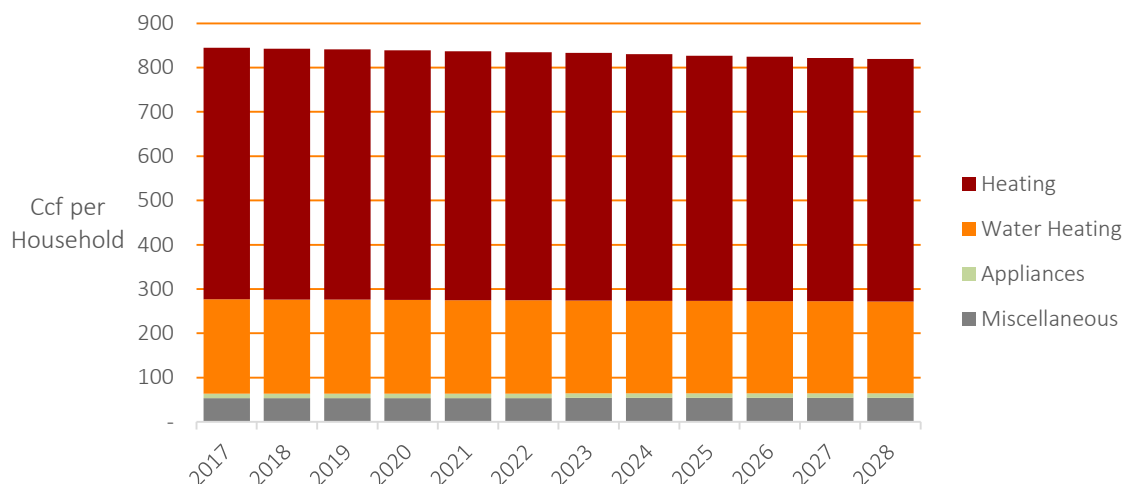
Residential Sector

Table 4-1 presents the baseline projection for natural gas use at the end-use and technology level for the residential sector as a whole. Overall, residential use is projected to increase from 248 million Ccf in 2017 to 25 million Ccf in 2023, an increase of 1.2%. While there is some steady customer growth throughout the forecast period, annual use per customer is declining, as shown in Figure 4-2. This reflects the adoption of more efficient appliances during the forecast horizon.

Table 4-1 Residential Baseline Projection by End Use and Technology (thousand Ccf)

End Use	Technology	2017	2018	2019	2020	2021	2022	2023
Heating	Furnace	163.4	163.4	163.7	163.9	164.2	164.6	165.0
	Boiler	3.2	3.1	3.1	3.1	3.0	3.0	3.0
Water Heating	Water Heater (<= 55 Gal)	50.3	50.4	50.5	50.6	50.7	50.8	50.9
	Water Heater (> 55 Gal)	12.2	12.3	12.3	12.3	12.4	12.4	12.4
Appliances	Clothes Dryer	0.6	0.6	0.6	0.6	0.6	0.7	0.7
	Stove	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Miscellaneous	Gas Fireplace	15.1	15.2	15.3	15.4	15.6	15.7	15.8
	Pool Heater	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Miscellaneous	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total		247.9	248.0	248.5	249.0	249.5	250.1	250.7

Figure 4-1 VEDO Residential Baseline Projection by End Use (million Ccf)**Figure 4-2** Residential Baseline Projection by End Use – Annual Use per Household



Commercial Sector

In the baseline projection, annual natural gas use in the commercial sector decreases from 100 million Ccf in 2017 to 98 million Ccf in 2023, a decrease of 2.2%. As in the residential sector, while the number of customers increases slightly, use per customer is going down, leading to a decrease in commercial gas usage in 2023. Figure 4-3 presents the baseline projection at the end-use level. Table 4-2 presents the baseline projection at the end-use and technology level for the commercial sector as a whole. Energy consumed by furnaces, boilers, and ovens decreases slightly over the forecast period as a result of the market turnover of older, less efficient units. The overall commercial sector growth effects are not large enough to counteract the market turnover effects for these end uses.

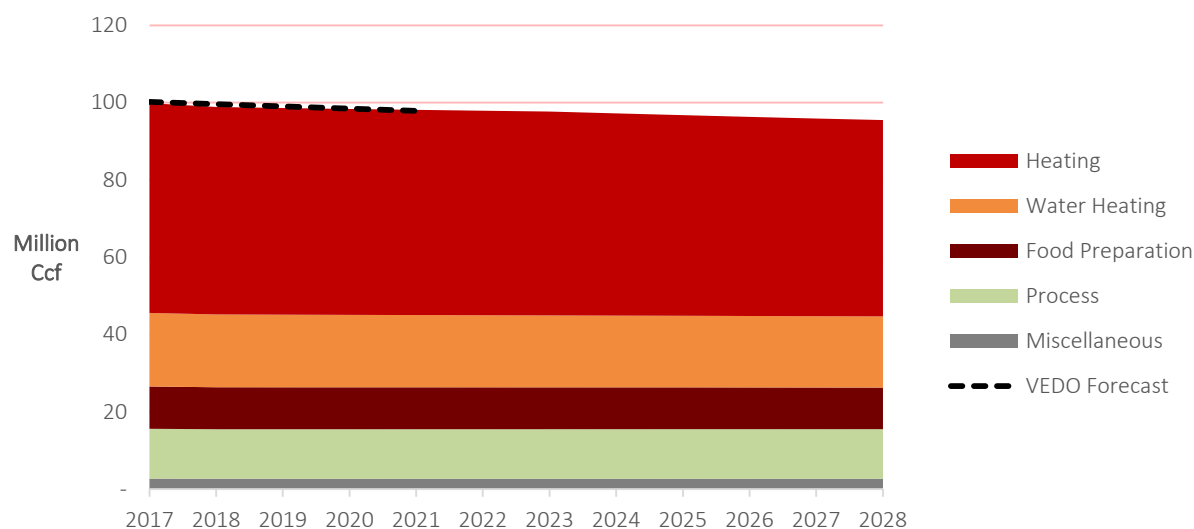


Figure 4-3 VEDO Commercial Baseline Projection by End Use (million Ccf)

Table 4-2 Commercial Baseline Projection by End Use and Technology (million Ccf)

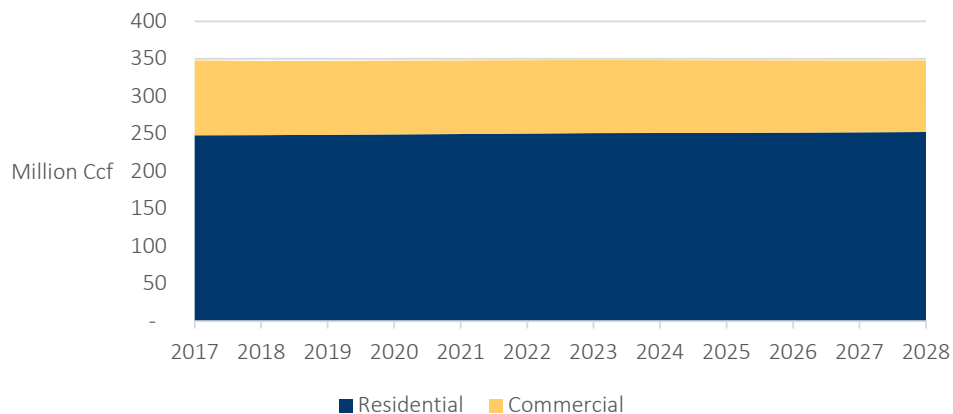
End Use	Technology	2017	2018	2019	2020	2021	2022	2023
Heating	Furnace	26	26	26	26	26	26	26
	Boiler	25	25	24	24	24	24	24
	Unit Heater	3	3	3	3	3	3	3
Water Heating	Water Heater	19	19	19	19	19	19	19
Food Preparation	Oven	1	1	1	1	1	1	1
	Fryer	4	4	4	4	4	4	4
	Steamer	0	0	0	0	0	0	0
	Griddle	3	3	3	3	3	3	3
	Broiler	3	3	3	3	3	3	3
Process	Process Heating	13	13	13	13	13	13	13
Miscellaneous	Miscellaneous	3	3	3	3	3	3	3
	Pool Heater	0	0	0	0	0	0	0
Total		100	99	99	98	98	98	98

Summary of Baseline Projections Across Sectors

Table 4-3 and Figure 4-4 provide a summary of the baseline projection by sector for the entire VEDO service territory. Overall, the forecast shows little or no growth in natural gas use after 2017.

Table 4-3 VEDO Baseline Projection by Sector (million Ccf)

Sector	2017	2018	2019	2020	2021	2022	2023
Residential	248	248	248	249	250	250	251
Commercial	100	99	99	98	98	98	98
Total	348	347	347	347	348	348	348

Figure 4-4 Baseline Projection Summary (million Ccf)

5

MEASURE-LEVEL DSM POTENTIAL

The total measure-level energy savings potential for VEDO includes every measure in the measure list, regardless of program implementation concerns. This section begins with a summary of annual energy savings potentials in Ccf across both sectors, then provides details for each sector. Please note that all savings are estimated at the customer meter.

Overall Summary of DSM Potential

Table 5-1 summarizes DSM savings in terms of annual energy use for all measures for three levels of potential relative to the baseline projection. Figure 5-2 displays the DSM forecasts.

- **Achievable potential** represents savings that are possible as a result of customers choosing to adopt the measures, accounting for customer adoption barriers, but not accounting for program design, budget, or staffing constraints. First year achievable potential is estimated to be 1.9 million Ccf, or 0.6% of baseline usage. Cumulative Achievable potential reaches 9.8 million Ccf savings in the last program-year (2023), or 2.8% of the baseline. Achievable potential reflects approximately 40% of economic potential throughout the forecast horizon.
- **Economic potential** reflects the savings when the most efficient cost-effective measures are taken by all customers. Economic potential in 2018 is 4.3 million Ccf, or 1.3% of the baseline. The cumulative last-program year savings in 2023 are 24.5 million Ccf, or 7.0% of the baseline projection.
- **Technical potential** reflects the adoption of all DSM measures regardless of cost-effectiveness or customer preferences. In 2018, the total technical potential is 7.0 million Ccf, or 2.0% of the baseline. For the last program year (2023) cumulative savings are 39.6 million Ccf, or 11.4% of the baseline projection.

In the summary tables below, we show both cumulative savings and incremental savings, defined as follows:

- **Cumulative savings** include savings from all measures installed to date. Re-purchased measures whose lifetimes previously expired will not add new cumulative potential, but they do prevent that potential from declining.
- **Incremental savings** show only savings from measures installed in that year, but includes re-purchase of previous measures whose lifetimes have expired. For this reason, the sum of incremental savings is usually greater than cumulative savings values.

Table 5-1 Summary of DSM Potential (Annual Energy, thousand Ccf)

	2018	2019	2020	2021	2022	2023
Baseline Projection (thousand Ccf)	346,909	347,094	347,332	347,661	348,006	348,426
Cumulative Savings (thousand Ccf)						
Achievable Potential	1,916	3,399	4,917	6,479	8,130	9,840
Economic Potential	4,346	8,320	12,281	16,252	20,352	24,489
Technical Potential	6,988	13,581	20,143	26,680	33,161	39,571
Cumulative Savings (% of Baseline)						
Achievable Potential	0.6%	1.0%	1.4%	1.9%	2.3%	2.8%
Economic Potential	1.3%	2.4%	3.5%	4.7%	5.8%	7.0%
Technical Potential	2.0%	3.9%	5.8%	7.7%	9.5%	11.4%
	2018	2019	2020	2021	2022	2023
Incremental Savings (thousand Ccf)						
Achievable Potential	1,916	2,012	2,055	2,114	2,222	2,291
Economic Potential	4,348	4,529	4,551	4,610	4,812	4,887
Technical Potential	6,978	7,186	7,261	7,352	7,435	7,992
Incremental Savings (% of Baseline)						
Achievable Potential	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%
Economic Potential	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%
Technical Potential	2.0%	2.1%	2.1%	2.1%	2.1%	2.3%

Figure 5-1 Cumulative DSM Potential across All Sectors (% of Baseline), Plan Years 2018-2023

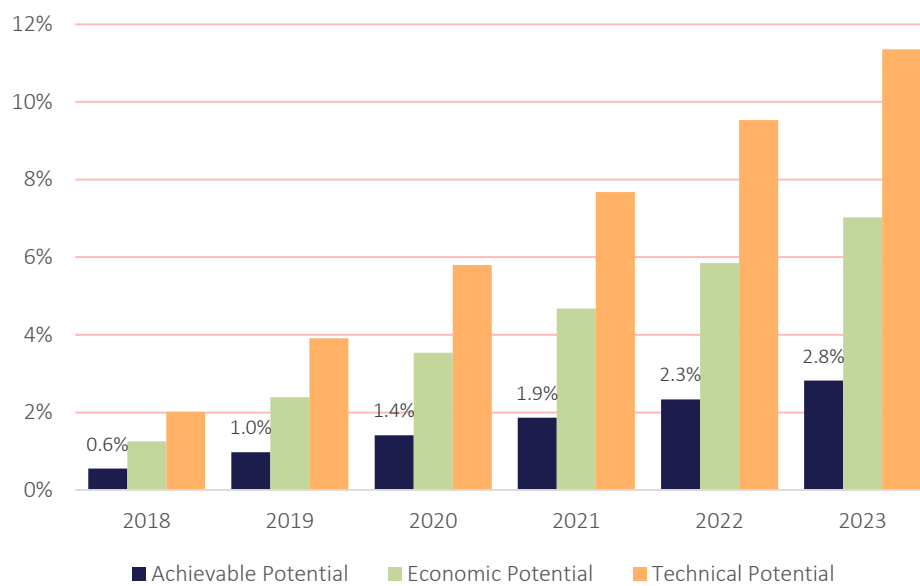
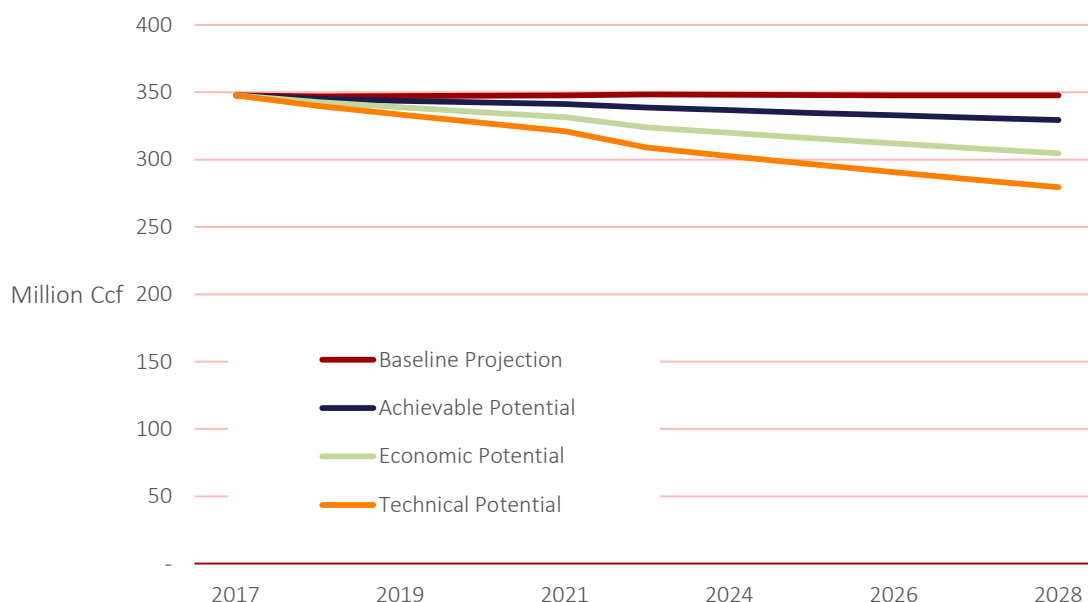


Figure 5-2 Baseline Projection and DSM Forecast Summary

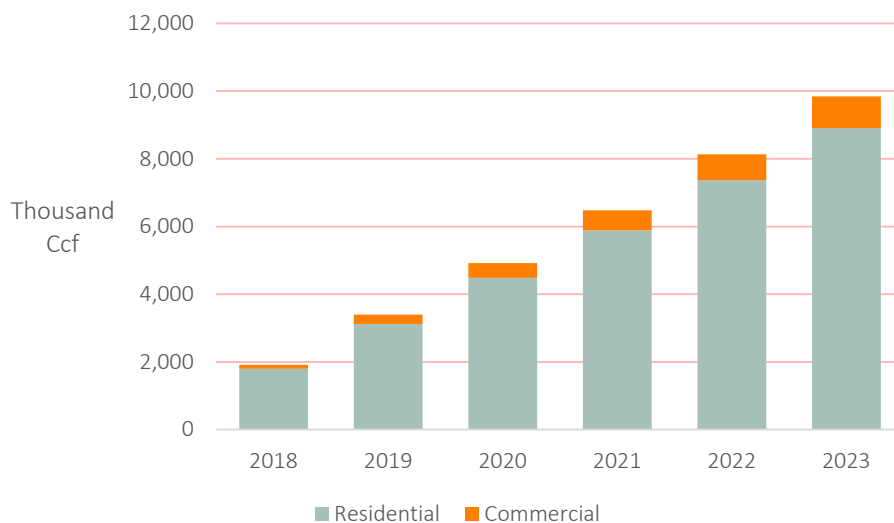
Summary of DSM Potential by Sector

Table 5-2 and Figure 5-3 summarize cumulative and incremental naturally achievable natural gas savings potential by sector. The residential sector contains the highest potential savings for two reasons. First, the sector is almost three times as large as the commercial sector in terms of base-year energy use. Second, the measure adoption rates are lower in VEDO's commercial sector when compared to other utilities because it has more relatively more smaller customers who typically participate in energy efficiency programs less frequently than do large customers.

Table 5-2 Cumulative and Incremental Achievable Annual DSM Potential by Sector

	2018	2019	2020	2021	2022	2023
Cumulative Potential (thousand Ccf)						
Residential	1,797	3,126	4,487	5,884	7,367	8,906
Commercial	118	273	430	595	764	934
Total	1,916	3,399	4,917	6,479	8,130	9,840
Incremental Potential (thousand Ccf)						
Residential	1,797	1,856	1,895	1,939	2,032	2,097
Commercial	118	156	160	174	189	194
Total	1,916	2,012	2,055	2,113	2,221	2,291

Figure 5-3 Cumulative Achievable DSM Potential by Sector, plan years 2018-2023



Residential Sector DSM Potential

Table 5-3 and Figure 5-4 present estimates for measure-level DSM potential for the residential sector. First year savings are 1.8 million Ccf, or 0.7% of the baseline projection. Cumulative achievable potential in the last program year, 2023, is 8.9 million Ccf, or 3.6% of the baseline projection. Incremental savings range from 1.8 million Ccf to 2.1 million Ccf per year. Achievable potential represents one third to one half of economic potential during the forecast.

Figure 5-4 Cumulative Residential DSM Savings (% of Baseline)

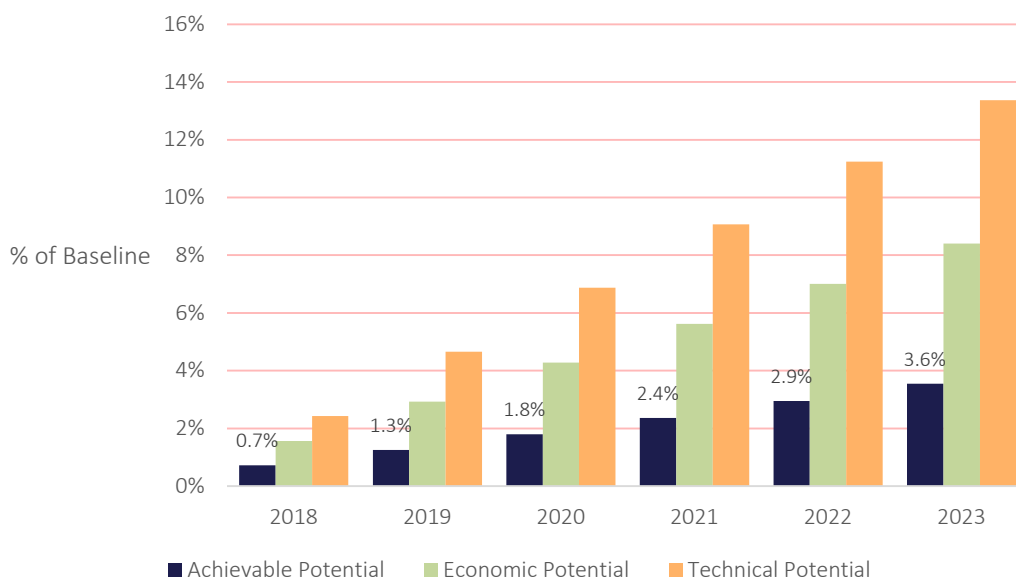


Table 5-3 Residential DSM Potential (Annual Energy, thousand Ccf)

2018	2019	2020	2021	2022	2023
------	------	------	------	------	------

Baseline Projection	248,027	248,483	248,972	249,523	250,096	250,730
Cumulative Savings						
Achievable Potential	1,797	3,126	4,487	5,884	7,367	8,906
Economic Potential	3,874	7,269	10,649	14,028	17,534	21,081
Technical Potential	6,026	11,587	17,125	22,641	28,112	33,532
Cumulative Savings (% of Baseline)						
Achievable Potential	0.7%	1.3%	1.8%	2.4%	2.9%	3.6%
Economic Potential	1.6%	2.9%	4.3%	5.6%	7.0%	8.4%
Technical Potential	2.4%	4.7%	6.9%	9.1%	11.2%	13.4%
	2018	2019	2020	2021	2022	2023
Incremental Savings						
Achievable Potential	1,797	1,856	1,895	1,939	2,032	2,097
Economic Potential	3,877	3,943	3,958	3,986	4,141	4,214
Technical Potential	6,028	6,149	6,196	6,242	6,265	6,702
Incremental Savings (% of Baseline)						
Achievable Potential	0.7%	0.7%	0.8%	0.8%	0.8%	0.8%
Economic Potential	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%
Technical Potential	2.4%	2.5%	2.5%	2.5%	2.5%	2.7%

Figure 5-5 presents forecasts of cumulative energy savings by end use throughout the time horizon. Space heating savings account for the majority of the savings throughout the forecast horizon. Savings from water heating measures come mostly from measures that modify use, and represent a small portion of savings throughout the study period.

Table 5-4 identifies the top residential measures in terms of cumulative energy savings by 2023.

- The top measure is high-efficiency furnaces, which aligns with the measure's predominance in the energy market profile.
- Wi-Fi-enabled thermostats, both the "basic" model and the "learning" model, have greater savings potential than do traditional programmable thermostats, and rank at 2nd and 3rd place. Both of the more advanced thermostats have the ability to control the thermostat settings through a Wi-fi connection, but the learning thermostats (such as a Nest thermostat), "learn" the customer's preferences and adjust settings accordingly.
- Behavioral programs still rank as the 4th best measure overall. Though this measure sometimes ranks higher in other utility jurisdictions, the population eligible to participate in such a program is limited due to the need for a control population to verify savings. VEDO provided an estimate that just 50,000 residential households would be eligible to participate in a behavioral program.
- The fifth-place measure, with 5.1% of the savings, is infiltration control and air sealing. This measure has provided significant savings in the past and this is expected to continue.

Figure 5-5 Residential Achievable Savings Projection

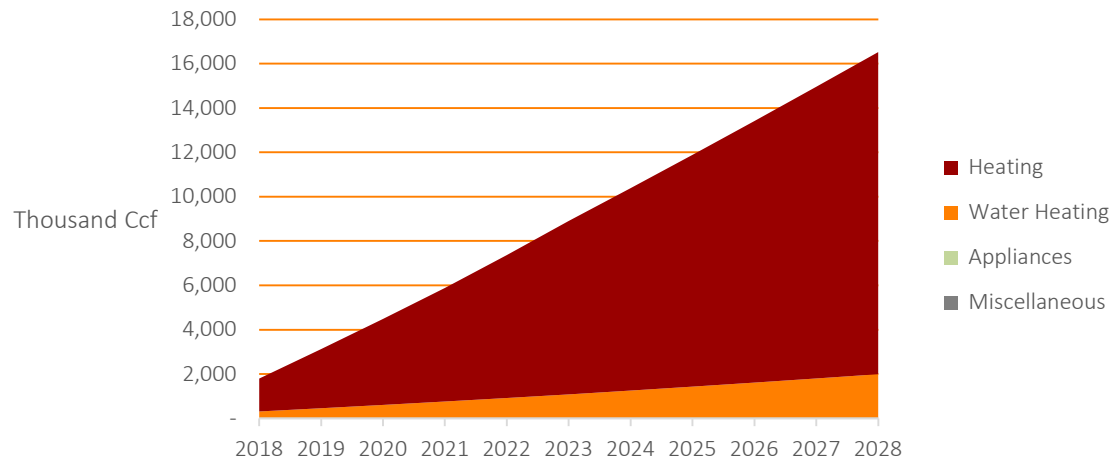


Table 5-4 Residential Top Measures in 2023

Rank	Measure / Technology	Cumulative Savings (Thousand Ccf)	% of Total
1	Heating – Furnace AFUE .98	3,203	36.0%
2	Wi-Fi Learning Thermostats	2,196	24.7%
3	Wi-Fi "Basic" Thermostats	683	7.7%
4	Behavioral Programs	514	5.8%
5	Infiltration Control & Air Sealing	457	5.1%
6	1.0 GPM Faucet Aerators	410	4.6%
7	1.6 GPM Low-Flow Showerheads	409	4.6%
8	Insulation - Wall Cavity	268	3.0%
9	Ducting - Repair and Sealing	246	2.8%
10	Furnace - Maintenance	135	1.5%
11	Insulation - Ceiling	106	1.2%
12	Insulation - Ducting	83	0.9%
13	Water Heater - Pipe Insulation	74	0.8%
14	Crawlspace Wall Insulation	55	0.6%
15	Heating – Boiler AFUE .96	46	0.5%
16	Water Heater - Shower Starters	11	0.1%
17	Water Heater Drain Heat Recovery	6	0.1%
18	Boiler - Maintenance	3	0.0%
Total		8,906	100.0%

Commercial Sector DSM Potential

Table 5-5 and Figure 5-6 present estimates for the three levels of DSM potential for the commercial sector. First year achievable savings are 118 thousand Ccf, or 0.1% of the baseline projection. In 2023, the last program year of the forecast, achievable potential is 934 thousand Ccf, or 1.0% of the baseline projection. Throughout the forecast horizon, achievable potential represents about 28% of economic potential.

Table 5-5 Commercial DSM Potential (Annual Energy, thousand Ccf)

	2018	2019	2020	2021	2022	2023
Baseline Projection	98,883	98,611	98,360	98,138	97,911	97,696
Cumulative Savings						
Achievable Potential	118	273	430	595	764	934
Economic Potential	472	1,051	1,633	2,224	2,819	3,407
Technical Potential	950	1,973	2,989	4,001	5,003	5,986
Cumulative Savings (% of Baseline)						
Achievable Potential	0.1%	0.3%	0.4%	0.6%	0.8%	1.0%
Economic Potential	0.5%	1.1%	1.7%	2.3%	2.9%	3.5%
Technical Potential	1.0%	2.0%	3.0%	4.1%	5.1%	6.1%
	2018	2019	2020	2021	2022	2023
Incremental Savings (thousand Ccf)						
Achievable Potential	118	156	160	174	189	194
Economic Potential	472	585	593	624	672	673
Technical Potential	950	1,037	1,065	1,110	1,170	1,289
Incremental Savings (% of Baseline)						
Achievable Potential	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%
Economic Potential	0.5%	0.6%	0.6%	0.6%	0.7%	0.7%
Technical Potential	1.0%	1.1%	1.1%	1.1%	1.2%	1.3%

Figure 5-6 Commercial Cumulative DSM Savings (% of Baseline), Plan Years 2018-2023

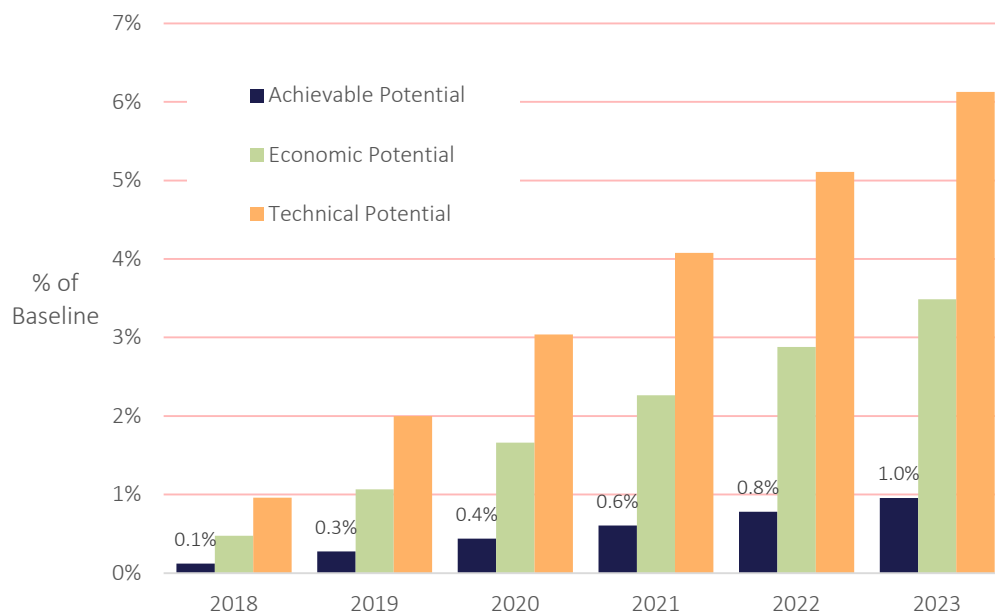


Figure 5-7 presents forecasts of cumulative energy savings by end use. Heating contains the largest share of the potential. Savings for water heating and food preparation also provide ample savings potential over time.

Figure 5-7 VEDO Commercial Achievable Savings Projection

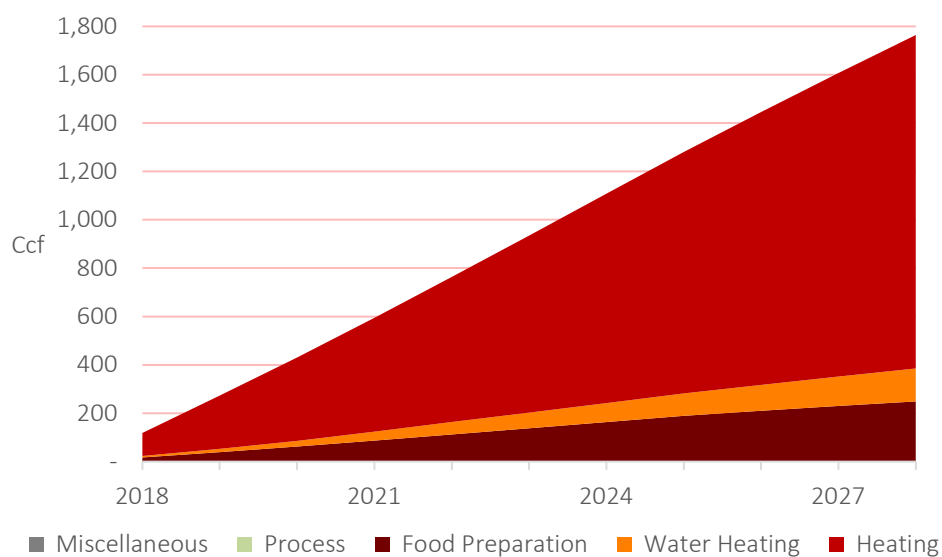


Table 5-6 identifies the top commercial-sector measures from the perspective of cumulative natural gas savings in 2023. Even though these are the top 20 measures within this sector, the two measures with the largest savings, high-efficiency boiler and furnace replacements, have a total potential that is a fraction of their residential counterparts. Since the largest commercial customers opt-out of participating in energy efficiency programs, the opportunities for savings shown here are from smaller customers. Typically, smaller commercial customers are slow to adopt energy efficiency. Nevertheless, there is potential in some specific segments. For example, there are six measures that can provide savings to the food service segment.

Table 5-6 Commercial Sector Top Measures in 2023

Rank	Measure / Technology	Cumulative Savings (thousand Ccf)	% of Total
1	Heating – Boiler AFUE .95/.96	228	24.4%
2	Heating – Furnace AFUE .98/.92	137	14.7%
3	Gas Boiler - Hot Water Reset	123	13.2%
4	Heating - Unit Heater	70	7.5%
5	Food Preparation - Fryer	55	5.9%
6	Gas Boiler - Maintenance	38	4.0%
7	Gas Boiler - Stack Damper	37	3.9%
8	HVAC - Occupancy Sensors	34	3.7%
9	Gas Boiler - Combustion Controls	27	2.9%
10	Food Preparation - Griddle	24	2.6%
11	Food Preparation - Oven	23	2.5%
12	Water Heater - EF 0.96	23	2.4%
13	Food Preparation - Broiler	21	2.3%
14	Water Heater - Pipe Insulation	21	2.2%
15	Wi-Fi "Basic" Thermostats	16	1.7%
16	Food Preparation - Steamer	14	1.5%
17	Water Heater - Faucet Aerators/Low Flow Nozzles	11	1.2%
18	Gas Boiler - Steam Trap Maintenance	9	0.9%
19	Water Heater - Spray Nozzles for Food Service	7	0.7%
20	Wi-Fi Learning Thermostats	4	0.4%
Total		923	98.8%
Total RAP savings in 2023		934	100.0%

6

PROGRAM POTENTIAL

Action Plan Development Process

There were many steps involved in developing the 2018-2023 Program Action Plan. The objective of these steps was to develop a plan based on market-specific information for VEDO, which could be successfully implemented utilizing realistic assessments of achievable market potential.

The first step in the process was to review the results of the Market Potential Study, where the achievable potential was used to help guide program design. The second step in the program planning process was to obtain input from various sources to help develop and refine a workable plan. Input was obtained from the VEDO Program Managers who oversee the current VEDO programs. They provided suggestions for program changes and enhancements. They also provided technical information and recommendations about measures to include, incentives, estimates of participation and estimated implementation costs. This data provided a foundation for the 2018-2023 Plan based on actual experience within VEDO's territory.

Other sources of program information were also considered. Current evaluations were used for adjustments to inputs. In addition, best practices were researched and reviewed to gain insights into the program design of successful DSM programs implemented at other utilities. Considering all of the above, adjustments were made to delivery mechanisms, measure bundles, participation rates, and other factors as appropriate to fine-tune the data for the six-year program implementation period. Results indicate the program potential savings are approximately 94% of the measure-level achievable potential from the market potential study over this six-year period. This is well within industry norms for this step in the planning process. Programs may be above or below the market potential for any single year as the MPS is a long-term forecast but programs usually do not reach the total achievable potential in the long run due to constraints on resources, delivery channels, time, or market response.

The last step was to conduct a cost benefit analysis for each program. Utilizing DSMore, the measures and programs were analyzed for cost effectiveness. The DSMore tool is used in many states across the country to determine cost-effectiveness. The DSMore cost effectiveness modeling tool takes hourly prices and hourly energy savings from the specific measures/technologies being considered for the energy efficiency program, and then correlates both to weather. This tool looks at over 30 years of historic weather variability to get the full weather variances appropriately modeled. In turn, this allows the model to capture the low probability, but high consequence weather events and apply appropriate value to them. Thus, a more accurate view of the value of the efficiency measure can be captured in comparison to other alternative supply options. The outputs include the California Standard Practice Manual results for TRC, UCT, Participant and RIM tests. Inputs into the model include participation rates, incentives paid, and energy savings of the measure, life of the measure, implementation costs, administrative costs, and incremental costs to the participant of the high efficiency measure. The plan assumes an inflation rate for all equipment and program costs of 2.8% annually. Financial inputs such as escalation rates and discount rates are provided by VEDO and match the company's other financial plans.

Cost Effectiveness

With the program budgets and impacts presented above, industry standard cost-effectiveness tests were performed with the DSMore software tool as described above to gauge the economic merits of the portfolio. Each test compares the benefits of the DSM programs to their costs – using its own unique perspectives and definitions – all defined in terms of the net present value of future

cash flows. The definitions for the four standard tests most commonly used in DSM 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 over time — resulting in lower average utility bills.

The cost effectiveness results for the VEDO program portfolio as shown in Table 6-2 below indicate that net benefits over the lifetime of the measures is \$24 million dollars for a TRC benefit-to-cost ratio of 1.73 (excluding the Low Income Weatherization Program). All the programs pass the TRC cost-effectiveness screen with a B/C ratio greater than 1.0. Not only does the total portfolio for the VEDO programs pass the TRC test, but the Residential and Commercial portfolios pass on their own, as does each individual program within the portfolios.

Table 6-1 VEDO 2018-2023 Plan Cost-Effectiveness Results

	TRC	UTC	RIM	PCT	Lifetime Cost/Ccf	1st Year Cost/Ccf	TRC Net Benefits (\$000)	UCT Net Benefits (\$000)
Business								
Prescriptive Program	2.59	3.01	0.93	3.11	\$0.19	\$3.55	\$2,393	\$2,604
Custom Program	1.23	2.18	0.81	1.42	\$0.31	\$3.67	\$260	\$761
Bus Evaluation	-	-	-	-	\$0.00	\$0.00	(\$97)	(\$97)
Business Portfolio	1.93	2.61	0.88	2.43	\$0.23	\$3.77	\$2,556	\$3,269
Residential								
Behavior	3.37	3.37	0.87	-	\$0.23	\$0.27	\$1,735	\$1,735
Rebates Program	1.74	2.90	1.00	1.38	\$0.21	\$3.97	\$13,185	\$20,345
Home Insulation	2.14	2.63	0.98	2.21	\$0.25	\$4.63	\$7,344	\$8,557
School Kit Program	2.57	2.57	0.93	-	\$0.27	\$3.14	\$2,585	\$2,585
Res Evaluation	-	-	-	-	\$0.00	\$0.00	(\$1,452)	(\$1,452)
Online Audit	-	-	-	-	\$0.00	\$0.00	(\$314)	(\$314)
Ed-Outreach	-	-	-	-	\$0.00	\$0.00	(\$1,593)	(\$1,593)
Residential Portfolio	1.71	2.38	0.92	1.71	\$0.26	\$3.07	\$21,492	\$29,864
Total Portfolio*	1.73	2.40	0.92	1.76	\$0.26	\$3.11	\$24,048	\$33,133

*Does not include Low Income Weatherization Program (VWP)

DSM Portfolio Objectives and Impact

The framework for the 2018-2023 Plan is a continuation of gas programs offered in 2017. The programs as proposed are consistent with the identified achievable cost-effective opportunities as identified in the Market Potential Study.

Plan Savings

The 2018-2023 Plan savings goal was calculated based on a percentage of weather normalized gas sales for 2016. Goals are based on “net” energy savings of eligible customers.

Table 6-2 below lists the Commercial, Residential, and Low Income Weatherization programs planned net energy savings targets split by sector.

Table 6-2 VEDO 2018-2023 Plan Participants, Incremental Energy Savings, and Budgets

	Participants	Energy Savings (thousand Ccf)	Total Program Budget (\$)
Residential Portfolio			
2018	76,212	1,777	\$4,210,876
2019	76,416	1,771	\$4,304,516
2020	76,621	1,765	\$4,400,864
2021	76,828	1,761	\$4,500,002
2022	77,033	1,757	\$4,601,988
2023	77,241	1,753	\$4,706,929
Business Portfolio			
2018	469	92	\$280,302
2019	518	107	\$343,502
2020	617	122	\$407,944
2021	684	137	\$477,573
2022	819	144	\$516,364
2023	883	151	\$549,146
Combined Portfolio			
2018	76,681	1,869	\$4,491,178
2019	76,934	1,878	\$4,648,017
2020	77,238	1,887	\$4,808,808
2021	77,512	1,897	\$4,977,575
2022	77,852	1,901	\$5,118,352
2023	78,124	1,903	\$5,256,075
Low Income Weatherization			
2018	290	83	\$1,987,274
2019	290	83	\$2,042,918
2020	290	83	\$2,100,120
2021	290	83	\$2,158,923
2022	290	83	\$2,219,373
2023	290	83	\$2,281,515

Comparison of Savings to Market Potential Study

The program design used the MPS for guidance to determine if the plan estimates were reasonable. While building from the ground up with estimates from the program team to help determine participation, this comparison to the MPS allowed the planning team to see if the results were reasonable. Table 6-3 shows this comparison of savings.

Table 6-3 Comparison of Program and Measure-Level Savings (Incremental thousand Ccf)

	MPS Measure Level Achievable Potential	Action Plan Program Potential	Program Potential as % of Achievable Potential
Residential Portfolio*			
2018	1,797	1,777	99%
2019	1,856	1,771	95%
2020	1,895	1,765	93%
2021	1,939	1,761	91%
2022	2,032	1,757	86%
2023	2,097	1,753	84%
Business Portfolio			
2018	118	92	78%
2019	156	107	69%
2020	160	122	76%
2021	174	137	78%
2022	189	144	76%
2023	194	151	78%
Low Income Weatherization Portfolio			
2018	N/A	83	N/A
2019	N/A	83	N/A
2020	N/A	83	N/A
2021	N/A	83	N/A
2022	N/A	83	N/A
2023	N/A	83	N/A
Combined Portfolio*			
2018	1,916	1,952	102%
2019	2,012	1,961	97%
2020	2,055	1,970	96%
2021	2,114	1,981	94%
2022	2,222	1,984	89%
2023	2,291	1,986	87%

* Includes VWP

Budgets

The program budgets were built based upon many inputs. First the measures were assigned incentives based upon existing program incentives, proposed incentives and leveraged evaluation recommendations. The full set of incentives and the projected participation by program measure can be seen in Appendix D. The second primary input for the costs were estimates for implementation informed by the current program implementation costs. This helps to assure that the estimates are realistic for successful delivery. The third cost area is the administrative costs made up of the internal costs for VEDO management of the programs and other costs such as marketing. VEDO Administrative costs were allocated at the portfolio level. The last cost area is the Evaluation, Measurement and Verification (“EM&V”) costs based on 5% of the budget. Table 6-4 presents budgets by cost category.

Table 6-4 VEDO 2018-2023 Plan Summary Budget by Portfolio

Residential	Incentives	Implementation	Administration	Online Audit	Outreach	EM&V	Total Cost
2018	\$1,614,001	\$1,204,998	\$723,204	\$64,000	\$325,000	\$279,674	\$4,210,876
2019	\$1,652,697	\$1,235,365	\$740,671	\$64,000	\$325,000	\$286,783	\$4,304,516
2020	\$1,692,523	\$1,266,606	\$758,641	\$64,000	\$325,000	\$294,095	\$4,400,864
2021	\$1,733,511	\$1,298,747	\$777,129	\$64,000	\$325,000	\$301,616	\$4,500,002
2022	\$1,775,684	\$1,331,807	\$796,146	\$64,000	\$325,000	\$309,351	\$4,601,988
2023	\$1,819,091	\$1,365,820	\$815,711	\$64,000	\$325,000	\$317,307	\$4,706,929
Total Residential	\$10,287,506	\$7,703,343	\$4,611,502	\$384,000	\$1,950,000	\$1,788,824	\$26,725,175
Business	Incentives	Implementation	Administration	Online Audit	Outreach	EM&V	Total Cost
2018	\$124,112	\$52,393	\$90,450	\$0	\$0	\$13,348	\$280,302
2019	\$152,512	\$63,633	\$111,000	\$0	\$0	\$16,357	\$343,502
2020	\$181,214	\$75,259	\$132,045	\$0	\$0	\$19,426	\$407,944
2021	\$212,290	\$87,692	\$154,850	\$0	\$0	\$22,742	\$477,573
2022	\$231,710	\$93,088	\$166,978	\$0	\$0	\$24,589	\$516,364
2023	\$247,618	\$97,877	\$177,501	\$0	\$0	\$26,150	\$549,146
Total Business	\$1,149,455	\$469,941	\$832,823	\$0	\$0	\$122,611	\$2,574,831
Res & Bus*	Incentives	Implementation	Administration	Online Audit	Outreach	EM&V	Total Cost
2018	\$1,738,112	\$1,257,391	\$813,654	\$64,000	\$325,000	\$293,022	\$4,491,178
2019	\$1,805,209	\$1,298,998	\$851,671	\$64,000	\$325,000	\$303,140	\$4,648,017
2020	\$1,873,737	\$1,341,865	\$890,686	\$64,000	\$325,000	\$313,520	\$4,808,808
2021	\$1,945,800	\$1,386,439	\$931,979	\$64,000	\$325,000	\$324,357	\$4,977,575
2022	\$2,007,394	\$1,424,895	\$963,123	\$64,000	\$325,000	\$333,939	\$5,118,352
2023	\$2,066,709	\$1,463,697	\$993,212	\$64,000	\$325,000	\$343,457	\$5,256,075
Total Res & Bus	\$11,436,961	\$8,173,284	\$5,444,325	\$384,000	\$1,950,000	\$1,911,435	\$29,300,006

*Does not include VWP

Weatherization	Incentives	Implementation	Administration	Total Cost
2018	\$0	\$1,788,547	\$198,727	\$1,987,274
2019	\$0	\$1,838,626	\$204,292	\$2,042,918
2020	\$0	\$1,890,108	\$210,012	\$2,100,120
2021	\$0	\$1,943,031	\$215,892	\$2,158,923
2022	\$0	\$1,997,436	\$221,937	\$2,219,373
2023	\$0	\$2,053,364	\$228,152	\$2,281,515
Total VWP	\$0	\$11,511,111	\$1,279,012	\$12,790,123

Key Inputs

The programs are based on known existing measures and technologies. The measure savings were calculated using the Ohio TRM and any VEDO specific evaluation data. When a measure was not in the Ohio TRM, other TRMs were referenced including Indiana, Michigan and Illinois.

Program Administration

There are three major components of program administration that were considered in the 2018-2023 Plan: internal labor/program support, customer outreach/education and marketing.

Internal Labor/Program Support

Based upon the EE and DR programs proposed in the 2018 - 2023 Plan, Vectren is proposing to maintain the staffing levels that were previously approved to support the portfolio. The major responsibilities associated with these FTEs are as follows:

- **Portfolio Management and Implementation** - Oversees the overall portfolio and staff necessary to support program administration. Serves as primary contact for regulatory and oversight of programs.
- **Reporting and Analysis** - Responsible for all aspects of program reporting including, budget analysis/reporting, scorecards and filings.
- **Outreach and Education** - Serves as contact to trade allies regarding program awareness. Also, serves as point of contact for residential and commercial/industrial customers to assist with responding to program inquiries.
- **Research and Evaluation** - Works with the selected EM&V Administrator and facilitates measurement and verification efforts, assists with program reporting/tracking.

Customer Outreach and Education

VEDO's Customer Outreach and Education efforts serve to raise awareness and drive customer participation as well as educate customers on how to manage their energy bills. The program includes the following goals as objectives:

1. Build awareness;
2. Educate consumers on how to conserve energy and reduce demand;
3. Educate customers on how to manage their energy costs and reduce their bill;
4. Communicate support of customer energy efficiency needs; and,
5. Drive participation in the DSM programs.

The marketing approach includes paid media as well as web-based tools to help analyze bills, energy audit tools, energy efficiency and DSM program education and information. Informational guides and sales promotion materials for specific programs are included in this budget.

This effort is the key to achieving greater energy savings by convincing the families and businesses making housing/facility, appliance and equipment investments to opt for greater energy efficiency. The first step in convincing the public and businesses to invest in energy efficiency is to raise their awareness.

It is essential that a broad public education and outreach campaign not only raise awareness of what consumers can do to save energy and control their energy bills, but to prime them for participation in the various DSM programs.

Marketing Plans

This effort will provide funding for cross-program public education activities, outreach, marketing and promotion to raise awareness of the benefits and methods of improving energy efficiency in homes and commercial businesses. Beyond energy efficiency education, an objective will be to motivate participation in the programs.

Types of activities that will be included in this effort are:

- Enhancement of the Conservation website to include the latest energy efficiency information for residential and commercial use.
- Targeted educational campaign for businesses to support the programs.
- Targeted educational campaign for residences to support the programs.
- Targeted training and educational program for trade allies.
- Distribution of federal Energy Star and other national organization materials in the service territory.

Delivery Organization

VEDO will oversee outreach and education for the programs. The Company will work closely with its implementation partners to provide consistent messaging across different program outreach and education efforts. VEDO will utilize the services of communication and energy efficiency experts to deliver the demand and energy efficiency message.

7

PROGRAM DETAIL

The 2018-2023 Plan is built from currently offered existing programs by VEDO to its customers. The programs in the 2018-2023 Plan include:

Residential Programs:

- Residential Prescriptive Rebates
- Home Insulation & Air Sealing
- School Education Program
- Home Energy Reports

Low Income Weatherization Program:

- Vectren Weatherization Program (VWP)

Business Programs:

- Commercial Prescriptive Rebates
- Commercial Custom Program

Residential Prescriptive Rebate Program

Program Description: The Residential Prescriptive Rebate Program is designed to influence customer purchasing decisions when replacing existing or installing new equipment. Financial incentives (online or mail-in rebates) are designed to encourage customers to purchase high efficiency products that would have otherwise purchased standard efficiency products in the absence of the program. These incentives help to reduce the incremental cost of purchasing higher efficiency and higher priced products. The program will foster sustainable improvements in the local VEDO market for these products. This will be accomplished using a combination of market push and pull strategies that stimulate demand from customers while simultaneously increasing trade ally investment in stocking and promotion of targeted products. The efficient equipment that will be promoted through this effort includes:

Table 7-1 Residential Prescriptive Measures

Measure	Incentive Per Unit	Savings per Unit (Ccf)
Boiler	\$500	190
Furnace 95	\$150	121
Furnace 97	\$400	151
Thermostat – Wi-Fi Enabled Basic EX	\$30	58
Thermostat – Wi-Fi Enabled Smart EX	\$50	67

The program will increase demand by educating customers about the energy and money saving benefits associated with efficient products via outreach and education, website and equipping trade allies to communicate the benefits to customers.

Eligible customers: The Residential Prescriptive Rebate Program will target single-family residential homes and multi-family properties.

Marketing: Marketing for the Residential Prescriptive Rebate Program relies on networking with trade allies, mass media messages to consumers and businesses, and website tools and promotions.

- **Customer Targeted Marketing:** Outreach and education efforts will continue to reach customers via bill inserts and mass media education that provides customers with low cost energy saving tips (e.g. program your thermostat, turn down your water heater temperature) while increasing awareness of incentive offers.
- **Vectren Live Smart webpage:** Information regarding the availability of incentives, program requirements, rebate claim forms, and product fact sheets will be available through www.vectren.com/Save_Energy. This resource will serve both customers and trade allies seeking information and program materials.
- **Energy Efficiency Advisory Team:** In addition, Vectren's call center fields referrals from the company's general call center and serves as a resource for interested customers. A toll-free number is provided on all outreach and education materials.

Delivery Organizations: VEDO staff will oversee the program and will utilize the services of an implementation firm to perform rebate fulfillment services.

Table 7-2 Residential Prescriptive Rebate Program Summary

Measure	2018	2019	2020	2021	2022	2023
---------	------	------	------	------	------	------

Measure	2018	2019	2020	2021	2022	2023
R6 Furnace 95						
Participation	2,500	2,500	2,500	2,500	2,500	2,500
Incentive Budget	\$375,000	\$385,500	\$396,294	\$407,390	\$418,797	\$430,523
Projected Ccf Savings	301,750	300,638	299,412	299,677	300,043	299,886
R6 Furnace 97						
Participation	1,000	1,000	1,000	1,000	1,000	1,000
Incentive Budget	\$400,000	\$411,200	\$422,714	\$434,550	\$446,717	\$459,225
Projected Ccf Savings	151,240	150,683	150,068	150,201	150,384	150,306
R2 Boiler						
Participation	40	40	40	40	40	40
Incentive Budget	\$20,000	\$20,560	\$21,136	\$21,727	\$22,336	\$22,961
Projected Ccf Savings	7,615	7,615	7,615	7,615	7,615	7,615
R10 Thermostat - Wi-Fi Enabled Basic EX						
Participation	1,800	1,800	1,800	1,800	1,800	1,800
Incentive Budget	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000
Projected Ccf Savings	103,662	101,700	99,703	97,715	95,756	93,734
R11 Thermostat - Wi-Fi Enabled Smart EX						
Participation	4,745	4,745	4,745	4,745	4,745	4,745
Incentive Budget	\$237,250	\$237,250	\$237,250	\$237,250	\$237,250	\$237,250
Projected Ccf Savings	319,718	314,168	308,534	302,944	297,465	292,132
* Note that participation is rounded to the nearest whole number.						

Table 7-3 Residential Prescriptive Summary Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$1,086,250	\$1,108,510	\$1,131,393	\$1,154,917	\$1,179,100	\$1,203,960
Implementation	\$564,014	\$575,573	\$587,454	\$599,669	\$612,225	\$625,133
Administration	\$438,678	\$447,668	\$456,909	\$466,409	\$476,175	\$486,215
Total Cost	\$2,088,942	\$2,131,750	\$2,175,756	\$2,220,995	\$2,267,500	\$2,315,307
Participation	10,085	10,085	10,085	10,085	10,085	10,085
Savings (Ccf)	883,985	874,804	865,333	858,153	851,264	843,672

Home Insulation and Air Sealing with Direct Install Program

Program Description: The Home Insulation and Air Sealing with Direct Install Program is a trade ally driven market approach to comprehensive energy efficiency projects. The objective of the program is to deliver air sealing and insulation upgrades to individually metered 1-4 unit single family homes in VEDO's territory through a network of participating contractors. The program will offer a direct install measure (DIM) package. The program administrator will offer to install the applicable measures during a quality control walk through process. The direct install package will include:

- One (1) Wi-Fi thermostat (Basic)
- Six (6) feet of pipe wrap
- Up to two (2) energy efficient showerheads
- Up to two (2) bath aerators
- One (1) kitchen aerator

The Vectren implementation subcontractor will recruit and train insulation contractors to offer and provide recommended shell improvements to their existing customers. Contractors will also receive training and supervision on air sealing which may be unfamiliar to insulation contractors. The program will continue to rely on BPI certified contractors to assess needs, provide recommendations, sell and install air sealing and insulation projects.

The program will offer cash incentives to help customers pay for the improvement work and to encourage customers to move forward and install comprehensive improvement packages. There are two "major measure" categories:

- Air sealing (includes closure of open flues)
- Insulation

It is recommended that air sealing be required as a measure before insulation is performed. To make it more affordable for customers to participate in the program, the rebate amount will be deducted from the total cost of the work scope and will be paid to the contractor once the project is completed. Table 5 outlines the proposed incentive structure for this program.

Table 7-4 Home Insulation and Air Sealing Program Incentive Structure

Measures	Per Unit	Bonus Per Unit	Max	Savings Per Unit*
Crawlspace Wall Insulation SF EX	\$.40/sf	\$.20/sf	\$250	61
Ducting - Repair and Sealing	\$40/hr	\$10/hr	\$200	159
Duct Insulation	\$.30/sf	\$.15/sf	\$300	62
Air Sealing	\$40/hr	\$10/hr	\$250	102
Attic Insulation R-32+	\$.50/sf	\$.30/sf	\$600	129*
Attic Insulation R-25 - R-31.9	\$.40/sf	\$.20/sf	\$600	129*
Attic Insulation R-19 - R-24.9	\$.30/sf	\$.15/sf	\$600	129*
Wall Insulation	\$.40/sf	\$.20/sf	\$700	231
Faucet Aerators - Direct Install	\$0.4			23
Low-Flow Showerheads - Direct Install	\$4			23
Pipe Insulation - Direct Install	\$24			7

Shower Starters - Direct Install

\$16

6

* Weighted Average Savings

Eligible customers: The program is available to VEDO residential natural gas customers in single family homes.

Marketing: The Implementer, in conjunction with VEDO's existing marketing strategy for energy efficiency programs, will use a program-specific marketing plan and communications strategy to reach eligible customers. The Implementer will also coordinate with trade allies with a customer base that would be receptive to the program.

Delivery Organizations: VEDO staff will oversee the program and utilize the services of an implementation firm to manage the trade ally installation services and provide cash incentive fulfillment services.

Table 7-5 Home Insulation and Air Sealing with Direct Install Program Summary

Measure	2018	2019	2020	2021	2022	2023
R4 Crawlspace Wall Insulation SF EX						
Participation	50	50	50	50	50	50
Incentive Budget	\$9,881	\$10,158	\$10,442	\$10,735	\$11,035	\$11,344
Projected Ccf Savings	3,064	3,006	2,946	2,887	2,828	2,770
R5 Ducting - Repair and Sealing						
Participation	100	100	100	100	100	100
Incentive Budget	\$13,728	\$14,112	\$14,508	\$14,914	\$15,331	\$15,761
Projected Ccf Savings	15,867	15,593	15,314	15,039	14,770	14,508
R8 Insulation - Ducting SF EX						
Participation	50	50	50	50	50	50
Incentive Budget	\$12,580	\$12,932	\$13,294	\$13,667	\$14,049	\$14,443
Projected Ccf Savings	3,080	3,016	2,951	2,886	2,822	2,759
R9 Insulation - Infiltration Control SF EX						
Participation	400	400	400	400	400	400
Incentive Budget	\$84,786	\$87,158	\$89,596	\$92,102	\$94,679	\$97,328
Projected Ccf Savings	40,680	40,680	40,680	40,680	40,680	40,680
R24 Insulation - Ceiling SF EX						
Participation	450	450	450	450	450	450
Incentive Budget	\$252,900	\$259,981	\$267,261	\$274,744	\$282,437	\$290,345
Projected Ccf Savings	58,055	58,055	58,055	58,055	58,055	58,055
R24 Insulation - Wall SF EX						
Participation	200	200	200	200	200	200
Incentive Budget	\$104,000	\$106,912	\$109,906	\$112,983	\$116,146	\$119,399
Projected Ccf Savings	46,236	46,236	46,236	46,236	46,236	46,236
R13 Water Heater - Faucet Aerators						
Participation	2,037	2,110	2,183	2,258	2,332	2,407
Incentive Budget	\$776	\$826	\$878	\$934	\$991	\$1,052
Projected Ccf Savings	46,613	48,208	49,818	51,449	53,073	54,729
R14 Water Heater - Low-Flow Showerheads						
Participation	2,037	2,110	2,183	2,258	2,332	2,407
Incentive Budget	\$7,174	\$7,638	\$8,125	\$8,638	\$9,171	\$9,732
Projected Ccf Savings	47,059	48,586	50,121	51,672	53,208	54,770

Measure	2018	2019	2020	2021	2022	2023
R15 Water Heater - Pipe Insulation						
Participation	1,689	1,740	1,792	1,843	1,894	1,945
Incentive Budget	\$40,090	\$42,477	\$44,960	\$47,544	\$50,228	\$53,020
Projected Ccf Savings	11,662	11,967	12,266	12,560	12,848	13,133
R16 Water Heater - Shower Starters						
Participation	115	121	128	134	141	147
Incentive Budget	\$1,835	\$1,993	\$2,159	\$2,334	\$2,516	\$2,708
Projected Ccf Savings	683	719	755	790	826	862
* Note that participation is rounded to the nearest whole number.						

Table 7-6 *Home Insulation and Air Sealing with Direct Install Program Budget*

	2018	2019	2020	2021	2022	2023
Incentives	\$527,751	\$544,187	\$561,129	\$578,594	\$596,584	\$615,131
Implementation	\$274,024	\$282,559	\$291,356	\$300,424	\$309,765	\$319,395
Administration	\$196,702	\$202,720	\$208,921	\$215,310	\$221,890	\$228,669
Total Cost	\$998,477	\$1,029,466	\$1,061,406	\$1,094,327	\$1,128,239	\$1,163,195
Participation	7,127	7,331	7,536	7,743	7,948	8,156
Savings (Ccf)	272,997	276,064	279,142	282,255	285,345	288,502

School Education Program

Program Description: The School Education Program is designed to raise awareness about how individual actions and low-cost measures can provide significant reductions in energy and water consumption. The program is offered to 5th-12th grade students who attend school within in the VEDO service territory. The goal of the program is to influence and educate students about conservation, the efficient use of natural gas, and to show their families how to be smart energy consumers. Families become involved as students are given energy efficient kits to take-home and the assignment to improve energy use in their own homes. The program is very effective in teaching students, families and teachers about how to use energy efficient devices and adopt conservation and energy efficiency behaviors. Program participants are encouraged to return a Home Installation Survey which provides valuable information on the adoption and installation of the energy savings measures. The program curriculum teaches energy efficiency programs aligned to Ohio's educational standards and Common Core. The program is a collaborative effort with Dayton Power & Light (DP&L) by cobranding materials and sharing costs and savings. Evaluated results indicate the kits save 11.02 Ccf per home per year.

Eligible Customers: The target market for this program is children in 5th-12th grade attending school systems within the VEDO service area.

Marketing: The delivery organization's curriculum is correlated to meet the Ohio Academic Content Standards. They will communicate directly with schools through letters and electronic communication systems utilized specifically by teachers or education administrators.

Delivery Organizations: VEDO and DP&L will work with a School Education Program vendor to provide energy education, interactive learning tools and programs for students, educators and business partners.

Table 7-7 School Education Program Summary

Measure	2018	2019	2020	2021	2022	2023
R17 School Kits						
Participation	9,000	9,000	9,000	9,000	9,000	9,000
Incentive Budget	\$0	\$0	\$0	\$0	\$0	\$0
Projected Ccf Savings	99,180	99,180	99,180	99,180	99,180	99,180

Table 7-8 School Education Program Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$0	\$0	\$0	\$0	\$0	\$0
Implementation	\$246,959	\$253,874	\$260,982	\$268,290	\$275,802	\$283,524
Administration	\$67,824	\$69,723	\$71,675	\$73,682	\$75,745	\$77,866
Total Cost	\$314,783	\$323,597	\$332,658	\$341,972	\$351,547	\$361,391
Participation	9,000	9,000	9,000	9,000	9,000	9,000
Savings (Ccf)	99,180	99,180	99,180	99,180	99,180	99,180

Home Energy Reports

Program Description: The Home Energy Reports residential behavioral program is an integrated gas and electric program with VEDO and Dayton Power and Light (DP&L). The program motivates behavior change and provides relevant, targeted information to the consumer through regularly scheduled direct contact. The direct contact, typically through mailed reports, helps the consumer to better understand their energy use. Once a consumer understands better how they use energy, they can then start conserving energy.

The program provides reports to residential customers in the VEDO and Dayton Power and Light (DP&L) service territory every other month combining energy usage data along with customer demographic, housing and utility data to develop specific, targeted recommendations that educate and motivate consumers to reduce their energy consumption. The recommendations provided in the report give the consumer a variety of ways to save energy (both Gas and Electric) in their home, from low to no cost to higher cost investments.

Program data and design will be delivered by a third-party vendor who will provide energy usage insight that drives customers to take action by selecting the most relevant information for each particular household, which ensures maximum relevancy and high response rate to the recommendations. Monthly emails and six mailed reports will be sent annually to each participating customer. This program will have minimum of 50K participants per year.

This program works in coordination with DP&L's electric behavioral program to ensure the most effective and efficient delivery of this program and to yield higher savings than implementation of a gas only or electric only program. This program is contingent on DP&L receiving approval of their current proposed DSM plan.

Evaluated results indicate this program savings 10.42 Ccf per home per year.

Eligible Customers: VEDO natural gas residential customers.

Marketing Plan: DP&L proposes to send the reports to a random set of eligible customers. Customers will be able to opt out of receiving the reports; otherwise the customer will automatically receive the reports.

Program Delivery: VEDO and DP&L will oversee the program and partner with a third-party vendor to deliver the program.

Table 7-9 Home Energy Reports Summary

Measure	2018	2019	2020	2021	2022	2023
R1 Behavioral Programs						
Participation	50,000	50,000	50,000	50,000	50,000	50,000
Incentive Budget	\$0	\$0	\$0	\$0	\$0	\$0
Projected Ccf Savings	521,242	521,242	521,242	521,242	521,242	521,242

Table 7-10 Home Energy Reports Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$0	\$0	\$0	\$0	\$0	\$0
Implementation	\$120,000	\$123,360	\$126,814	\$130,365	\$134,015	\$137,768
Administration	\$20,000	\$20,560	\$21,136	\$21,727	\$22,336	\$22,961
Total	\$140,000	\$143,920	\$147,950	\$152,092	\$156,351	\$160,729

Participation	50,000	50,000	50,000	50,000	50,000	50,000
Savings (Ccf)	521,242	521,242	521,242	521,242	521,242	521,242

Table 7-11 shows the total budget by cost category for all of the residential sector programs combined. Note that the Low Income Weatherization program is not included in this total.

Table 7-11 Residential Sector Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$1,614,001	\$1,652,697	\$1,692,523	\$1,733,511	\$1,775,684	\$1,819,091
Implementation	\$1,204,998	\$1,235,365	\$1,266,606	\$1,298,747	\$1,331,807	\$1,365,820
Administration	\$723,204	\$740,671	\$758,641	\$777,129	\$796,146	\$815,711
Online Audit	\$64,000	\$64,000	\$64,000	\$64,000	\$64,000	\$64,000
Outreach	\$325,000	\$325,000	\$325,000	\$325,000	\$325,000	\$325,000
EM&V	\$279,674	\$286,783	\$294,095	\$301,616	\$309,351	\$317,307
Total	\$4,210,876	\$4,304,516	\$4,400,864	\$4,500,002	\$4,601,988	\$4,706,929
Participation	76,212	76,416	76,621	76,828	77,033	77,241
Savings (Ccf)	1,777,404	1,771,290	1,764,898	1,760,830	1,757,031	1,752,596

Vectren Weatherization Program

Overview: Vectren Weatherization Program (VWP), formally known as Project TEEM (Teaching Energy Efficiency Measures) is a Low Income Weatherization Program that assists VEDO customers to make energy efficient improvements to their homes. The program is administered by The Community Action Partnership of the Greater Dayton Area (Dayton CAP) and improvements are provided at no cost to the customer. Dayton CAP subcontracts with three smaller CAP agencies to deliver services to VEDO's service territory. The Ohio Home Weatherization program is divided into two sections based on income eligibility requirements.

Program Description: The program focuses on shell measures such as insulation and air sealing, but also includes replacement of non-functioning natural gas furnaces and water heaters, and minor repairs intended to increase the health and safety of the occupants of the home. Participation is limited by the annual budget and a waiting list of eligible customers is maintained for each program.

- **VWP I** has provided single-family home weatherization services for customers with incomes up to 200% of the federal poverty guidelines. The program was initiated in 2005 and is funded by VEDO through base rates at \$1.1M annually.¹² The program includes measures and protocols prescribed by the State of Ohio Home Weatherization Assistance Program (HWAP). VWP I program design permits service to income eligible customers on either a stand-alone basis or in conjunction with the HWAP.
- **VWP II** was launched in 2007 and originally funded at \$2 million for a two-year period.¹³ Subsequently, VWP II was identified as an additional program to be funded by the EEFRR rider at approximately \$1 million annually.¹⁴ VWP II is a unique income-qualified program that funds home weatherization for customers in the range of 201% up to 300% of the federal poverty income guidelines. VWP II is intended to benefit customers who have traditionally been unable to access any sort of assistance funds, yet do not have the disposable income to make needed energy efficiency improvements to their homes. The program includes measures and protocols prescribed by the State of Ohio Home Weatherization Assistance Program (HWAP).

Quality Assurance: VEDO contracts with an independent inspector to perform quality assurance inspections for the VWP programs. This ensures that weatherization service work is completed to the highest standards and that no safety or health hazards exist due to the work performed through the programs. On-site quality checks are performed for a percentage of all programs as follows:

- VWP I: 5% of jobs completed within 0-150% federal poverty income range.
- VWP I: 15% of jobs completed within 151-200% federal poverty income level range.
- VWP II: 15% of all homes weatherized through the program.

For both VWP I and VWP II, desk reviews are performed on 60% of the homes weatherized through these programs. Desk reviews verify that the appropriate paperwork and permits are filed and that required city inspections on furnace and water heater work are performed.

Marketing: Outreach efforts are performed by Dayton CAP and includes the distribution of quarterly newsletters which include information about the VWP programs, along with additional agency program offerings, presentations at community events, faith-based organizations and distribution of brochures, magnets and pens. Dayton CAP also distributes copies of a VWP video in order to provide information about how the program works and the measures that an eligible customer may receive. This video plays continuously in the lobbies of the various CAP agencies when clients are applying for the various assistance programs that the agency offers. Both VWP programs now enjoy

¹² Established originally by stipulated agreement in Case No. 04-571-GA-AIR and continued by agreement in Case No. 07-1080-GA-AIR.

¹³ As a result of Case No. 05-1444-GA-UNC.

¹⁴ As part of the settlement agreement in Case No. 07-1080-GA-AIR

steady participation and customer demand requires that Dayton CAP maintain a waiting list of prospective clients.

Conclusion: The VWP program continues to reach its target market, which includes customers who have not traditionally been eligible for weatherization assistance. The partnership between Dayton CAP and VEDO has proven to be very effective in delivering weatherization services to low-to-moderate income households with the desired result of reducing overall natural gas consumption and providing customers with an increased ability to manage their energy costs.

Low Income Weatherization Forecast and Budget

The 2018-2023 weatherization forecast is based on historical Ccf savings and average cost per home. The savings estimates are based on an analysis of VWP I and VWP II homes weatherized in 2014. The analysis was performed by The Cadmus Group, Inc. (Cadmus) and considered twelve months of weather normalized consumption before and after the job completion date. Based on this information, VEDO is forecasting that the 2018 VWP program will produce a total of 83,070 Ccf savings. The VWP 1 savings per unit are 260 Ccf, while the VWP II savings per unit are 319 Ccf.

Table 7-12 VWP Program Summary

Measure	2018	2019	2020	2021	2022	2023
R21 VWP I						
Participation	160	160	160	160	160	160
Incentive Budget	\$0	\$0	\$0	\$0	\$0	\$0
Projected Ccf Savings	41,600	41,600	41,600	41,600	41,600	41,600
R22 VWP II						
Participation	130	130	130	130	130	130
Incentive Budget	\$0	\$0	\$0	\$0	\$0	\$0
Projected Ccf Savings	41,470	41,470	41,470	41,470	41,470	41,470

Table 7-13 VWP Program Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$0	\$0	\$0	\$0	\$0	\$0
Implementation	\$1,788,547	\$1,838,626	\$1,890,108	\$1,943,031	\$1,997,436	\$2,053,364
Administration	\$198,727	\$204,292	\$210,012	\$215,892	\$221,937	\$228,152
Total Cost	\$1,987,274	\$2,042,918	\$2,100,120	\$2,158,923	\$2,219,373	\$2,281,515
Participation	290	290	290	290	290	290
Savings (Ccf)	83,070	83,070	83,070	83,070	83,070	83,070

Commercial Prescriptive Rebate Program

Program Description: Similar to the Residential Prescriptive program, the Commercial Prescriptive Rebate Program is designed to influence commercial customers to install energy efficient technologies. Financial incentives (mail-in rebates) are intended to encourage customers to purchase

high efficiency products that would have otherwise purchased standard efficiency products in the absence of the program.

The program will increase demand by educating customers about the energy and money saving benefits associated with efficient products via outreach and education, website and equipping trade allies to communicate such benefits to customers. The program will foster sustainable improvements in the local VEDO market for these products. Product availability is addressed as market providers adjust to meet increased demand generated by incentive offers and consumer education activities. The efficient equipment that will be promoted through this effort includes:

Table 7-14 Commercial Rebate Prescriptive Measures

Measure	Incentive per Unit	Savings
Boiler ¹⁵	\$3,000	1,250
IR Heater	\$500	316
Fryer	\$672	505
Furnace	\$386	175
Gas Boiler - Combustion Controls	\$404	216
Gas Boiler - Hot Water Reset	\$404	1,246
Gas Boiler - Maintenance	\$200	258
Gas Boiler - Stack Damper	\$88	542
Gas Boiler - Steam Trap Maintenance	\$47	87
Griddle	\$34	148
HVAC - Occupancy Sensors	\$29	38
Oven	\$919	263
Thermostat - Wi-Fi Enabled Basic	\$30	50
Thermostat - Wi-Fi Enabled Smart	\$50	59
Tankless Water Heater	\$13	18
Water Heater - Pipe Insulation	\$9	12
Water Heater - Spray Nozzles for Food Service	\$58	75

Eligible customers: Commercial Prescriptive rebates target commercial customers in rate classes 320, 321 and 325, defined as those whose annual usage is less than 150,000 Ccf.

Marketing: The Commercial Prescriptive Rebate Program relies on networking with trade allies, mass media messages to consumers and businesses, and website tools and promotions.

Delivery Organizations: VEDO staff will oversee the program and will utilize the services of an implementation firm to perform rebate fulfillment services.

Table 7-15 Commercial Prescriptive Rebate Program Summary

Measure	2018	2019	2020	2021	2022	2023
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¹⁵ The actual per unit incentive for the commercial boiler is a custom amount calculated based on \$6/MMBTU with a maximum payout of \$5,000.

Measure	2018	2019	2020	2021	2022	2023
C1 Boiler						
Participation	15	20	25	30	32	34
Incentive Budget	\$45,000	\$60,000	\$75,000	\$90,000	\$96,000	\$102,000
Projected Ccf Savings	18,750	25,000	31,250	37,500	40,000	42,500
C2 IR Heater						
Participation	5	10	15	20	25	30
Incentive Budget	\$2,500	\$5,000	\$7,500	\$10,000	\$12,500	\$15,000
Projected Ccf Savings	1,580	3,160	4,740	6,320	7,900	9,480
C3 Fryer						
Participation	3	4	5	5	5	5
Incentive Budget	\$2,352	\$3,088	\$3,369	\$3,645	\$3,901	\$4,056
Projected Ccf Savings	1,768	2,259	2,397	2,523	2,626	2,656
C4 Furnace						
Participation	70	75	80	85	90	95
Incentive Budget	\$27,009	\$29,748	\$32,620	\$35,629	\$38,781	\$42,082
Projected Ccf Savings	12,222	13,095	13,968	14,841	15,714	16,587
C5 Gas Boiler - Combustion Controls						
Participation	12	12	12	13	17	17
Incentive Budget	\$4,678	\$4,918	\$5,170	\$5,570	\$7,522	\$7,895
Projected Ccf Savings	2,503	2,536	2,571	2,677	3,555	3,550
C6 Gas Boiler - Hot Water Reset						
Participation	10	10	10	10	10	11
Incentive Budget	\$3,901	\$4,093	\$4,295	\$4,507	\$4,721	\$4,947
Projected Ccf Savings	12,046	12,132	12,220	12,329	12,437	12,571
C7 Gas Boiler - Maintenance						
Participation	12	12	13	25	25	26
Incentive Budget	\$2,412	\$2,465	\$2,519	\$4,986	\$5,090	\$5,198
Projected Ccf Savings	3,115	3,150	3,189	3,226	3,267	3,309
C8 Gas Boiler - Stack Damper						
Participation	7	7	7	7	7	7
Incentive Budget	\$577	\$606	\$637	\$669	\$701	\$736
Projected Ccf Savings	3,568	3,599	3,634	3,672	3,710	3,754
C9 Gas Boiler - Steam Trap Maintenance						

Measure	2018	2019	2020	2021	2022	2023
Participation	10	10	10	11	11	11
Incentive Budget	\$461	\$484	\$507	\$532	\$557	\$584
Projected Ccf Savings	862	866	870	876	881	889
C10 Griddle						
Participation	5	6	7	8	8	8
Incentive Budget	\$161	\$220	\$249	\$276	\$299	\$321
Projected Ccf Savings	710	944	1,042	1,122	1,183	1,236
C11 HVAC - Occupancy Sensors						
Participation	75	76	76	77	153	154
Incentive Budget	\$2,201	\$2,276	\$2,355	\$2,437	\$4,977	\$5,147
Projected Ccf Savings	2,894	2,884	2,874	2,867	2,858	2,851
C13 Oven						
Participation	3	3	4	4	4	4
Incentive Budget	\$2,444	\$3,261	\$3,696	\$4,097	\$4,438	\$4,540
Projected Ccf Savings	699	907	1,000	1,079	1,137	1,131
C16 Thermostat - Wi-Fi Enabled Basic						
Participation	10	10	10	10	10	10
Incentive Budget	\$300	\$300	\$300	\$300	\$300	\$300
Projected Ccf Savings	502	497	492	488	484	480
C17 Thermostat - Wi-Fi Enabled Smart						
Participation	50	60	70	80	90	100
Incentive Budget	\$2,500	\$3,000	\$3,500	\$4,000	\$4,500	\$5,000
Projected Ccf Savings	2,925	3,479	4,025	4,565	5,100	5,629
C18 Tankless Water Heater						
Participation	5	17	80	100	125	150
Incentive Budget	\$67	\$236	\$1,136	\$1,451	\$1,865	\$2,301
Projected Ccf Savings	92	316	1,483	1,842	2,303	2,763
C20 Water Heater - Pipe Insulation						
Participation	156	161	166	171	176	182
Incentive Budget	\$1,346	\$1,428	\$1,515	\$1,607	\$1,701	\$1,800
Projected Ccf Savings	1,931	1,987	2,044	2,101	2,156	2,210
C21 Water Heater - Spray Nozzles for Food Service						

Measure	2018	2019	2020	2021	2022	2023
Participation	6	7	8	10	11	21
Incentive Budget	\$329	\$415	\$507	\$606	\$707	\$1,358
Projected Ccf Savings	428	523	620	719	814	1,097
* Note that participation is rounded to the nearest whole number.						

Table 7-16 *Commercial Prescriptive Rebate Program Budget*

	2018	2019	2020	2021	2022	2023
Incentives	\$98,237	\$121,538	\$144,876	\$170,312	\$188,561	\$203,265
Implementation	\$19,897	\$24,671	\$29,495	\$34,775	\$38,690	\$41,957
Administration	\$54,908	\$68,403	\$82,026	\$97,026	\$107,536	\$116,398
Total Cost	\$173,042	\$214,612	\$256,396	\$302,112	\$334,787	\$361,620
Participation	453	501	599	665	800	865
Savings (Ccf)	66,595	77,335	88,418	98,745	106,125	112,693

Commercial Custom Program

Program Description: The Commercial Custom Program offers business customers incentives for qualifying energy efficiency upgrades not covered under the Commercial prescriptive rebate program. This program encourages the purchase and installation of efficient technologies or implementation of process improvements. VEDO will partner with a qualified implementation subcontractor/engineering firm to deliver this program.

VEDO's field representative will work directly with key customers and market providers to identify potential energy savings projects and answer questions on program requirements. Once prospective energy saving projects are identified, VEDO's representative and the implementing engineer will work with the customer and/or market provider to complete custom engineering calculations.

If the project is deemed eligible, the implementer and VEDO will assist the customer or market provider in completing the grant application and will manage the allocation of funds. Prior to starting a project, customers must complete an application and attach documentation verifying the energy savings potential, payback horizon, project eligibility and incentive amount. When the project is approved, Vectren will send a Letter of Intent (LOI) to the applicant confirming the amount of the incentive that will be paid once the project is completed.

Once projects are implemented, the customer will submit incentive claims along with all necessary documentation to VEDO. The Implementation Engineer will review the applications and will verify savings calculations are correct prior to payment. The VEDO representative will monitor the status of the rebate application and project until the point of payment.

Eligible Customers: Commercial customers in rate classes 320, 321 and 325, defined as those whose annual usage is less than 150,000 Ccf.

Marketing: VEDO will provide outreach and education to contractors to inform them of the program offerings through direct contacts with key customers and market providers (e.g. mechanical contractors). This approach is highly dependent upon referrals and networking with trade allies to identify projects. Outreach will include in-person visits to customers and market providers, attending and presenting at public seminars and trade association meetings, (e.g. ASHRAE, school administrators, hospitality), direct mail, newsletters and other targeted media and networking.

Delivery Organizations: Vectren will contract with an implementation/engineering firm to perform the engineering review and rebate fulfillment for this program.

Table 7-17 Commercial Custom Program Summary

Measure	2018	2019	2020	2021	2022	2023
C22 Windows - High Efficiency - Schools Custom						
Participation	10	10	10	10	10	9
Incentive Budget	\$322	\$327	\$333	\$338	\$343	\$349
Projected Ccf Savings	79	77	75	74	72	70
C23 Custom						
Participation	6	7	8	9	9	9
Incentive Budget	\$25,553	\$30,646	\$36,005	\$41,640	\$42,806	\$44,004
Projected Ccf Savings	25,200	29,400	33,600	37,800	37,800	37,800
* Note that participation is rounded to the nearest whole number.						

Table 7-18 shows the total budget by cost category for all of the commercial sector programs combined.

Table 7-18 Commercial Custom Program Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$25,875	\$30,974	\$36,338	\$41,978	\$43,149	\$44,353
Implementation	\$32,496	\$38,962	\$45,764	\$52,917	\$54,398	\$55,920
Administration	\$35,542	\$42,597	\$50,020	\$57,824	\$59,441	\$61,103
Total Cost	\$93,912	\$112,532	\$132,122	\$152,719	\$156,988	\$161,376
Participation	16	17	18	19	19	18
Savings (Ccf)	25,279	29,477	33,675	37,874	37,872	37,870

Table 7-19 Commercial Sector Budget

	2018	2019	2020	2021	2022	2023
Incentives	\$124,112	\$152,512	\$181,214	\$212,290	\$231,710	\$247,618
Implementation	\$52,393	\$63,633	\$75,259	\$87,692	\$93,088	\$97,877
Administration	\$90,450	\$111,000	\$132,045	\$154,850	\$166,978	\$177,501
EM&V	\$13,348	\$16,357	\$19,426	\$22,742	\$24,589	\$26,150
Total Cost	\$280,302	\$343,502	\$407,944	\$477,573	\$516,364	\$549,146
Participation	469	518	617	684	819	883
Savings (Ccf)	91,874	106,812	122,094	136,619	143,997	150,564

Support Services

Customer Outreach

The mission of energy efficiency programs provided by VEDO is to educate and encourage customers toward making energy efficient decisions for their home and/or business. Typically, VEDO practices a multi-faceted approach to ensure the communication channels to reach each program target are utilized. Using creative methods, media messages will be short, quick and succinct featuring everyday people in situations related to appliance rebates, programs and tips. Bill inserts, press releases, customer e-mails and a variety of mass media messaging will assist VEDO in educating customers about rebate programs available to help assist the choice of high efficiency. Mass media outreach will focus on television, radio and print advertising, as well as digital marketing including YouTube, Pandora, Weather.com, Hulu, Twitter, Facebook and web display. Also available to customers is an enhanced Save Energy portion of the Vectren website which outlines and details energy efficiency programs in detail and helps guide customers on options for them to save. Information regarding the availability of incentives, program requirements, rebate claim forms, and product fact sheets is available through Vectren's website at www.vectren.com/Save_Energy. This resource serves both customers and trade allies seeking information and program materials. The

budget for customer outreach and education will be \$325,000 annually.

Energy Efficiency Advisory Team

The Energy Efficiency Advisory Team fields referrals from the company's general call center and serves as a resource for interested customers. A toll-free number is provided on all outreach and education materials. Direct calls are initial contacts from customers or market providers coming through the dedicated toll-free number printed on all Vectren's conservation materials. Transferred calls are customers that have spoken with a Vectren Energy Efficiency Advisor and have either asked or been offered a transfer to an Energy Efficiency Advisor who is trained to respond to energy efficiency questions or conduct the on-line energy audit. These customer communication channels provide support mechanisms for VEDO customers to receive the following services:

- Provide general guidance on energy saving behaviors and investments using customer specific billing data via the on-line tool (bill analyzer and energy audit).
- Respond to questions about the residential and general service programs.
- Facilitate the completion of and provide a hard copy report from the online audit tool for customers without internet access or who have difficulty understanding how to use the tool.
- Respond to inquiries about rebate fulfillment status.

In an effort to ensure that the Energy Efficiency Advisors are providing the most appropriate and best value-added service to VEDO customers, Vectren provides continuous improvement and training for staff. This effort focuses on preparing these representatives with resources, training, tools and tips to be able to provide a more consultative response and customized recommendations to customers who are seeking information and solutions regarding energy efficiency. What is appropriate for one customer might not suit another customer's needs, and the continuous training process has better equipped representatives to be able to provide solutions that fit the customer's individual situation.

Program Evaluation

VEDO will utilize an independent evaluation, measurement and verification (EM&V) contractor to evaluate VEDO's natural gas DSM programs. Each year selected programs will be reviewed for program performance, saving results, customer satisfaction and cost-effectiveness. Plans will be developed each year to assure that the EM&V effort is focused on the programs with the most impact and where there might be uncertainty. EM&V efforts represent 5% of the portfolio budget.

A

MARKET PROFILES

This appendix presents the market profiles for each sector and segment, beginning with residential.

Table A-1 Residential Natural Gas Market Profile – Single Family

Total Households:		150,506			
Ccf:		116,897,090			
Ccf/HH		776.7			
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)	Usage (Ccf)
Space Heating	Furnace	83.8%	603.1	505.1	76,015,829
Space Heating	Boiler	0.6%	628.3	3.8	567,333
Water Heating	Water Heater <= 55 gal	63.7%	245.6	156.4	23,534,230
Water Heating	Water Heater > 55 gal	14.9%	260.4	38.7	5,822,627
Appliances	Clothes Dryer	4.5%	27.4	1.2	187,051
Appliances	Stove/Oven	12.4%	54.5	6.8	1,019,937
Miscellaneous	Gas Fireplace	15.1%	420.1	63.6	9,569,082
Miscellaneous	Pool Heater	0.5%	220.0	1.2	178,980
Miscellaneous	Miscellaneous	100.0%	0.0	0.0	2,021
Total				776.7	116,897,090

Table A-2 Residential Natural Gas Market Profile – Multi Family

Total Households:		26,847			
Ccf:		15,196,847			
Ccf/HH		566.1			
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)	Usage (Ccf)
Space Heating	Furnace	78.8%	496.4	391.1	10,500,558
Space Heating	Boiler	4.0%	509.2	20.4	546,767
Water Heating	Water Heater <= 55 gal	69.1%	163.1	112.8	3,027,065
Water Heating	Water Heater > 55 gal	14.2%	172.9	24.6	659,255
Appliances	Clothes Dryer	8.5%	21.4	1.8	48,640
Appliances	Stove/Oven	18.2%	54.6	9.9	266,312
Miscellaneous	Gas Fireplace	1.6%	323.1	5.3	141,358
Miscellaneous	Pool Heater	0.0%	77.0	0.0	0
Miscellaneous	Miscellaneous	100.0%	0.3	0.3	6,892
Total				566.1	15,196,847

Table A-3 Residential Natural Gas Market Profile – Single Family Low Income

		Total Households:	84,609		
		Ccf:	60,561,893		
		Ccf/HH	715.8		
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)	Usage (Ccf)
Space Heating	Furnace	80.0%	574.7	459.7	38,896,349
Space Heating	Boiler	3.0%	589.4	17.7	1,496,026
Water Heating	Water Heater <= 55 gal	67.0%	231.6	155.3	13,137,600
Water Heating	Water Heater > 55 gal	15.6%	245.5	38.4	3,250,387
Appliances	Clothes Dryer	12.1%	27.4	3.3	280,577
Appliances	Stove/Oven	12.5%	54.5	6.8	576,486
Miscellaneous	Gas Fireplace	7.7%	420.1	32.3	2,734,024
Miscellaneous	Pool Heater	1.0%	220.0	2.1	178,980
Miscellaneous	Miscellaneous	100.0%	0.1	0.1	11,465
Total				715.8	60,561,894

Table A-4 Residential Natural Gas Market Profile – Multi Family Low Income

		Total Households:	30,101		
		Ccf:	14,892,619		
		Ccf/HH	494.8		
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)	Usage (Ccf)
Space Heating	Furnace	80.0%	437.2	349.7	10,527,430
Space Heating	Boiler	0.5%	498.2	2.5	74,981
Water Heating	Water Heater <= 55 gal	65.0%	147.6	96.0	2,888,921
Water Heating	Water Heater > 55 gal	13.4%	156.5	20.9	629,169
Appliances	Clothes Dryer	3.8%	21.4	0.8	24,320
Appliances	Stove/Oven	13.5%	54.6	7.4	221,927
Miscellaneous	Gas Fireplace	5.4%	323.1	17.5	525,758
Miscellaneous	Pool Heater	0.0%	77.0	0.0	0
Miscellaneous	Miscellaneous	100.0%	0.0	0.0	113
Total				494.8	14,892,619

Table A-5 Residential New Construction Natural Gas Market Profile – Single Family

Ccf/HH			789.8	
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)
Space Heating	Furnace	89.3%	602.2	537.6
Space Heating	Boiler	0.3%	622.0	1.9
Water Heating	Water Heater <= 55 gal	47.8%	242.9	116.0
Water Heating	Water Heater > 55 gal	11.1%	259.4	28.9
Appliances	Clothes Dryer	4.5%	27.4	1.2
Appliances	Stove/Oven	14.3%	54.5	7.8
Miscellaneous	Gas Fireplace	22.7%	420.1	95.4
Miscellaneous	Pool Heater	0.5%	193.2	1.0
Miscellaneous	Miscellaneous	100.0%	0.0	0.0
Total			789.9	

Table A-6 Residential New Construction Natural Gas Market Profile – Multi Family

Ccf/HH			545.5	
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)
Space Heating	Furnace	84.0%	493.7	414.6
Space Heating	Boiler	2.0%	505.4	10.1
Water Heating	Water Heater <= 55 gal	51.8%	161.3	83.7
Water Heating	Water Heater > 55 gal	10.7%	172.3	18.3
Appliances	Clothes Dryer	8.5%	21.4	1.8
Appliances	Stove/Oven	20.9%	54.6	11.4
Miscellaneous	Gas Fireplace	1.6%	323.1	5.3
Miscellaneous	Pool Heater	0.0%	67.6	0.0
Miscellaneous	Miscellaneous	100.0%	0.3	0.3
Total			545.5	

Table A-7 Residential New Construction Natural Gas Market Profile – Single Family Low Income

Ccf/HH			687.3	
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)
Space Heating	Furnace	85.3%	573.8	489.4

Space Heating	Boiler	1.5%	583.6	8.8
Water Heating	Water Heater <= 55 gal	50.3%	229.1	115.2
Water Heating	Water Heater > 55 gal	11.7%	244.6	28.7
Appliances	Clothes Dryer	12.1%	27.4	3.3
Appliances	Stove/Oven	14.4%	54.5	7.8
Miscellaneous	Gas Fireplace	7.7%	420.1	32.3
Miscellaneous	Pool Heater	1.0%	193.2	1.9
Miscellaneous	Miscellaneous	100.0%	0.1	0.1
Total				687.5

Table A-8 Residential New Construction Natural Gas Market Profile – Multi Family Low Income

Ccf/HH			485.6	
End Use	Technology	Saturation	UEC (Ccf)	Intensity (Ccf/HH)
Space Heating	Furnace	85.3%	434.8	370.8
Space Heating	Boiler	0.3%	494.6	1.2
Water Heating	Water Heater <= 55 gal	48.8%	146.0	71.2
Water Heating	Water Heater > 55 gal	10.0%	155.9	15.6
Appliances	Clothes Dryer	3.8%	21.4	0.8
Appliances	Stove/Oven	15.5%	54.6	8.5
Miscellaneous	Gas Fireplace	5.4%	323.1	17.5
Miscellaneous	Pool Heater	0.0%	67.6	0.0
Miscellaneous	Miscellaneous	100.0%	0.0	0.0
Total				485.6

Commercial Market Profiles

Table A-9 Commercial/Industrial Natural Gas Market Profile – Small Office

Total Floor Space (MSqFt):		22.5			
Ccf:		10,186,646			
Ccf/sqft:		0.45			
End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	74.1%	0.28	0.21	4,726,740
Space Heating	Boiler	21.0%	0.76	0.16	3,564,975
Space Heating	Other Heating	2.5%	0.26	0.01	145,073
Water Heating	Water Heater	57.1%	0.12	0.07	1,494,909
Food Preparation	Oven	1.6%	0.03	0.00	9,748
Food Preparation	Fryer	1.6%	0.04	0.00	15,103
Food Preparation	Broiler	0.0%	0.05	0.00	0
Food Preparation	Griddle	1.6%	0.03	0.00	11,249
Food Preparation	Steamer	0.0%	0.04	0.00	0
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	218,850
Total			0.45	10,186,646	

Table A-10 Commercial/Industrial Natural Gas Market Profile – Large Office

Total Floor Space (MSqFt):		23.7			
Ccf:		7,482,420			
Ccf/sqft:		0.32			
End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	18.1%	0.14	0.02	587,546
Space Heating	Boiler	70.1%	0.27	0.19	4,440,086
Space Heating	Other Heating	2.5%	0.12	0.00	72,810
Water Heating	Water Heater	63.2%	0.10	0.07	1,560,454
Food Preparation	Oven	20.8%	0.03	0.01	169,859
Food Preparation	Fryer	20.8%	0.05	0.01	263,163
Food Preparation	Broiler	0.0%	0.06	0.00	0
Food Preparation	Griddle	20.8%	0.04	0.01	196,007
Food Preparation	Steamer	0.0%	0.05	0.00	0
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	192,495
Total			0.32	7,482,420	

Table A-11 Commercial/Industrial Natural Gas Market Profile – Restaurant**Total Floor Space (MSqFt): 5.3**

Ccf: 10,768,252

Ccf/sqft: 2.04

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	82.7%	0.33	0.27	1,430,075
Space Heating	Boiler	6.4%	1.21	0.08	412,434
Space Heating	Other Heating	0.0%	0.29	0.00	0
Water Heating	Water Heater	78.2%	0.58	0.45	2,389,165
Food Preparation	Oven	13.0%	0.32	0.04	216,644
Food Preparation	Fryer	85.1%	0.49	0.42	2,191,270
Food Preparation	Broiler	76.9%	0.52	0.40	2,115,777
Food Preparation	Griddle	87.8%	0.36	0.32	1,684,814
Food Preparation	Steamer	5.6%	0.42	0.02	123,297
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.04	0.04	204,776
Total				2.04	10,768,252

Table A-12 Commercial/Industrial Natural Gas Market Profile – Retail**Total Floor Space (MSqFt): 14.4**

Ccf: 7,768,821

Ccf/sqft: 0.54

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	84.0%	0.41	0.34	4,968,662
Space Heating	Boiler	2.7%	0.80	0.02	311,103
Space Heating	Other Heating	3.9%	0.37	0.01	208,067
Water Heating	Water Heater	68.5%	0.18	0.12	1,757,962
Food Preparation	Oven	13.2%	0.06	0.01	123,444
Food Preparation	Fryer	13.2%	0.10	0.01	191,252
Food Preparation	Broiler	0.0%	0.11	0.00	0
Food Preparation	Griddle	0.0%	0.07	0.00	0
Food Preparation	Steamer	0.0%	0.09	0.00	0
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	208,331
Total				0.54	7,768,821

Table A-13 Commercial/Industrial Natural Gas Market Profile – Grocery**Total Floor Space (MSqFt): 3.5**

Ccf: 1,929,812
Ccf/sqft: 0.55

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	36.6%	0.31	0.11	395,860
Space Heating	Boiler	30.8%	0.82	0.25	887,142
Space Heating	Other Heating	0.0%	0.28	0.00	0
Water Heating	Water Heater	46.5%	0.25	0.11	402,366
Food Preparation	Oven	28.6%	0.05	0.01	48,459
Food Preparation	Fryer	28.6%	0.07	0.02	75,078
Food Preparation	Broiler	0.0%	0.08	0.00	0
Food Preparation	Griddle	28.6%	0.06	0.02	55,919
Food Preparation	Steamer	0.0%	0.06	0.00	0
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.02	0.02	64,989
Total				0.55	1,929,812

Table A-14 Commercial/Industrial Natural Gas Market Profile – College

Total Floor Space (MSqFt): 2.5

Ccf: 1,215,760
Ccf/sqft: 0.49

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	15.8%	0.16	0.03	63,449
Space Heating	Boiler	78.9%	0.35	0.28	686,632
Space Heating	Other Heating	0.1%	0.15	0.00	268
Water Heating	Water Heater	88.9%	0.16	0.14	346,268
Food Preparation	Oven	16.7%	0.03	0.01	13,442
Food Preparation	Fryer	10.8%	0.05	0.01	13,475
Food Preparation	Broiler	16.7%	0.05	0.01	22,255
Food Preparation	Griddle	23.6%	0.04	0.01	21,898
Food Preparation	Steamer	10.5%	0.04	0.00	11,111
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	1.2%	0.00	0.00	100
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	36,862
Total				0.49	1,215,760

Table A-15 Commercial/Industrial Natural Gas Market Profile – School

Total Floor Space (MSqFt): 3.4

Ccf: 1,461,593
Ccf/sqft: 0.43

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	16.3%	0.13	0.02	72,204
Space Heating	Boiler	81.2%	0.28	0.23	781,378
Space Heating	Other Heating	0.1%	0.12	0.00	305
Water Heating	Water Heater	93.2%	0.12	0.11	394,107
Food Preparation	Oven	45.2%	0.03	0.01	47,233
Food Preparation	Fryer	14.5%	0.05	0.01	23,531
Food Preparation	Broiler	32.4%	0.05	0.02	56,142
Food Preparation	Griddle	27.9%	0.04	0.01	33,628
Food Preparation	Steamer	9.5%	0.04	0.00	13,149
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.3%	0.00	0.00	29
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	39,888
Total				0.43	1,461,593

Table A-16 Commercial/Industrial Natural Gas Market Profile – Health

Total Floor Space (MSqFt): **3.3**

Ccf: 4,458,382

Ccf/sqft: 1.34

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	28.5%	0.44	0.12	414,988
Space Heating	Boiler	51.0%	1.01	0.52	1,720,111
Space Heating	Other Heating	0.0%	0.39	0.00	0
Water Heating	Water Heater	80.2%	0.63	0.50	1,681,594
Food Preparation	Oven	4.7%	0.24	0.01	38,629
Food Preparation	Fryer	27.4%	0.38	0.10	346,391
Food Preparation	Broiler	6.2%	0.40	0.03	83,336
Food Preparation	Griddle	6.2%	0.28	0.02	58,083
Food Preparation	Steamer	2.9%	0.32	0.01	30,805
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.03	0.03	84,445
Total				1.34	4,458,382

Table A-17 Commercial/Industrial Natural Gas Market Profile – Lodging

Total Floor Space (MSqFt): **2.4**

Ccf: 1,304,936

Ccf/sqft: 0.53

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
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Space Heating	Furnace	11.6%	0.19	0.02	53,793
Space Heating	Boiler	37.1%	0.32	0.12	291,142
Space Heating	Other Heating	10.3%	0.17	0.02	42,997
Water Heating	Water Heater	95.4%	0.31	0.30	724,421
Food Preparation	Oven	25.0%	0.08	0.02	47,524
Food Preparation	Fryer	9.5%	0.12	0.01	27,968
Food Preparation	Broiler	9.5%	0.13	0.01	29,888
Food Preparation	Griddle	25.4%	0.09	0.02	55,691
Food Preparation	Steamer	0.4%	0.10	0.00	971
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	9.9%	0.00	0.00	693
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	29,849
Total				0.53	1,304,936

Table A-18 Commercial/Industrial Natural Gas Market Profile – Warehouse

Total Floor Space (MSqFt): 13.5

Ccf: 4,392,553

Ccf/sqft: 0.33

End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	66.0%	0.27	0.18	2,403,231
Space Heating	Boiler	11.1%	0.62	0.07	933,272
Space Heating	Other Heating	18.5%	0.24	0.04	606,278
Water Heating	Water Heater	62.9%	0.04	0.03	367,257
Food Preparation	Oven	1.1%	0.01	0.00	1,535
Food Preparation	Fryer	1.1%	0.02	0.00	2,379
Food Preparation	Broiler	1.1%	0.02	0.00	2,542
Food Preparation	Griddle	1.1%	0.01	0.00	1,772
Food Preparation	Steamer	1.1%	0.01	0.00	2,023
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.01	0.01	72,265
Total				0.33	4,392,553

Table A-19 Commercial/Industrial Natural Gas Market Profile – Miscellaneous

Total Floor Space (MSqFt):		21.8			
Ccf:		18,439,048			
Ccf/sqft:		0.85			
End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	46.1%	0.46	0.21	4,665,889
Space Heating	Boiler	32.0%	0.91	0.29	6,319,506
Space Heating	Other Heating	11.2%	0.42	0.05	1,017,234
Water Heating	Water Heater	70.5%	0.31	0.22	4,753,230
Food Preparation	Oven	33.1%	0.05	0.02	360,704
Food Preparation	Fryer	1.4%	0.08	0.00	23,994
Food Preparation	Broiler	16.2%	0.08	0.01	292,246
Food Preparation	Griddle	18.0%	0.06	0.01	225,926
Food Preparation	Steamer	0.0%	0.07	0.00	0
Process	Process Heating	0.0%	0.00	0.00	0
Miscellaneous	Pool Heater	1.2%	0.01	0.00	2,551
Miscellaneous	Miscellaneous	100.0%	0.04	0.04	777,769
Total				0.85	18,439,048

Table A-20 Commercial/Industrial Natural Gas Market Profile – Industrial

Total Floor Space (MSqFt):		13.7			
Ccf:		16,493,692			
Ccf/sqft:		1.20			
End Use	Technology	Saturation	EUI (Ccf)	Intensity (Ccf/SqFt)	Usage (Ccf)
Space Heating	Furnace	56.1%	0.36	0.20	2,749,750
Space Heating	Boiler	9.4%	0.83	0.08	1,067,839
Space Heating	Other Heating	15.7%	0.32	0.05	693,697
Water Heating	Water Heater	62.9%	0.06	0.04	494,366
Food Preparation	Oven	1.1%	0.01	0.00	2,067
Food Preparation	Fryer	1.1%	0.02	0.00	3,202
Food Preparation	Broiler	1.1%	0.02	0.00	3,422
Food Preparation	Griddle	1.1%	0.02	0.00	2,385
Food Preparation	Steamer	1.1%	0.02	0.00	2,723
Process	Process Heating	100.0%	0.81	0.81	11,054,557
Miscellaneous	Pool Heater	0.0%	0.00	0.00	0
Miscellaneous	Miscellaneous	100.0%	0.03	0.03	419,684
Total				1.20	16,493,692

B

MARKET ADOPTION RATES

Adoption rates shown are for the first year of a given measure or program. Adoption rates are defined to grow by 0.5% each year, representing increasing customer awareness and acceptance over time as the program/measure gains traction.

Residential Market Adoption Rates

Table B-1 Residential sector first year measure adoption rates

Source	Measure/Technology Type	Single Family	Multi Family	Single Family Low Income	Multi Family Low Income
Vectren Ohio Customer Survey and Program History	Air sealing	15%	6%	21%	5%
	EE Windows	6%	3%	9%	0%
	Programmable Thermostat	58%	25%	55%	46%
	Water Heater Setback	14%	3%	12%	14%
Regional Utility Customer Surveys	Furnace/Boiler	37%	37%	37%	37%
	Water Heater	37%	37%	37%	37%
	Clothes Dryer	37%	37%	37%	37%
	Stove / Range	35%	35%	35%	35%
	Add / Upgrade Insulation	29%	29%	29%	29%
	Add ductwork insulation	28%	28%	28%	28%
	Repair & Seal Ductwork	30%	30%	30%	30%
	Maintain Heating	34%	34%	34%	34%
Cadmus Evaluation	Low Flow Showerhead	44%	44%	44%	44%

Commercial Market Adoption Rates

Table B-2 Commercial sector first year measure adoption rates

Source	Measure/Technology	Adoption Factor
Vectren IN program history	Cooking Equipment	20%
Vectren OH program history	Furnace	14%
	Add / Upgrade Insulation	37%
	Boiler	40%
	Water Heater	39%
	Water Conservation	39%
	Duct Sealing/Insulation	38%
	EE Windows	37%
Regional Utility Surveys	HVAC controls	43%
	HVAC Maintenance	41%
	Install an Energy Management System	36%
	Pre-rinse Spray Valves	38%
	Programmable Thermostat	42%
	Retrocommissioning	39%
	Strategic Energy Management	35%

C

MEASURE LEVEL DATA FROM MARKET POTENTIAL STUDY

This appendix is an embedded spreadsheet file that presents the measure-level assumptions and details used for the market potential study.



Appendix C - VEDO
Measure Level Data fr

D

PROGRAM-LEVEL MEASURE DATA AND ASSUMPTIONS

This appendix provides the program-level assumptions used for individual measures in the DSMore analysis and program plan. Table D-1 presents the Residential measures and Table D-2 presents the Commercial measures.



Appendix D -
Program Data.xlsx

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Attachment C

Measures	Measures Implemented				Incentive Expenditures				CCF Savings			
	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal
Residential Prescriptive												
92 % AFUE Furnace	377	1,744	2,000	87%	\$75,400	\$348,800	\$400,000	87%	33,930	156,960	180,000	87%
Early Retirement Furnace	11	128	83	154%	\$2,200	\$25,600	\$16,667	154%	1,859	21,632	14,083	154%
.62 EF Storage Water Heater	76	437	383	114%	\$7,600	\$43,700	\$38,333	114%	1,216	6,992	6,133	114%
.82 EF Tankless Water Heater	6	79	33	239%	\$900	\$11,850	\$4,950	239%	468	6,162	2,574	239%
90% AFUE Boiler	10	35	8	438%	\$5,000	\$17,500	\$4,000	438%	670	2,345	536	438%
Subtotal	480	2,423	2,508	97%	\$91,100	\$447,450	\$463,950	96%	38,143	194,091	203,327	95%
Residential New Construction												
ES Cert - 85	0	0	17	0%	\$0	\$0	\$8,333	0%	0	0	3,467	0%
ES Cert - 70	1	6	4	150%	\$750	\$4,500	\$3,000	150%	416	2,496	1,664	150%
Subtotal	1	6	21	29%	\$750	\$4,500	\$11,333	40%	416	2,496	5,131	49%
Commercial Prescriptive												
92 % AFUE Furnace	2	20	125	16%	\$400	\$4,000	\$25,000	16%	430	4,300	26,875	16%
90% AFUE Commercial Boiler	3	9	21	43%	\$5,264	\$24,716	\$104,167	24%	3,111	11,731	53,333	22%
.62 EF Storage Water Heater	0	2	21	10%	\$0	\$200	\$2,083	10%	0	32	333	10%
.82 EF Tankless Water Heater	3	7	33	21%	\$450	\$1,050	\$5,000	21%	234	546	2,600	21%
.88 TE Water Heater	0	0	21	0%	\$0	\$0	\$15,625	0%	0	0	12,500	0%
Subtotal	8	38	221	17%	\$6,114	\$29,966	\$151,875	20%	3,775	16,609	95,642	17%
Residential On-line Audit and Water Heating Kit												
Level 3 audits/kits	115	1,117	1,000	112%	\$1,564	\$13,526	\$28,967	47%	3,450	33,510	30,000	112%
Programmable Thermostat	2	12	10	120%	\$40	\$240	\$200	120%	70	420	350	120%
Subtotal	117	1,129	1,010	112%	\$1,604	\$13,766	\$29,167	47%	3,520	33,930	30,350	112%
Home Energy Savings Program - Home Performance Pilot												
Home audits	24	114	100	114%	\$4,956	\$27,363	\$41,667	66%				
DWH Direct Install Measures	77	280	228	123%	\$0				1,386	7,040	5,776	122%
Air Sealing & Insulation	0	1	25	4%	\$2,532				0	309	12,686	2%
Subtotal	101	395	353	112%	\$7,488	\$27,363	\$41,667	66%	1,386	7,349	18,462	40%
Commercial Re-Commissioning Pilot												
Building audits	4	4	4	100%	\$7,447	\$7,447						
Proposals Accepted	0	0	4	0%	\$0	\$0	\$3,125	0%	0	0	6,667	0%
Portfolio Totals	711	3,995	4,120	97%	\$114,503	\$530,491	\$701,117	76%	47,240	254,475	359,578	71%

Conservation Connection Call Center	Dec	YTD
Direct calls	339	2,655
Transferred calls	195	1,493
Total calls	534	4,148

Aclara Online Audit Tool	Dec	YTD
Total new users	1,593	11,229
Total unique users	5,176	36,675
Total return users	3,980	28,147

Vectren Group Outreach	Attended
KMO Chamber Exhibit Table	150
City Of Vandalia and Waibel Energy Systems	16
C W Reality Check local high school students	400

Trade Ally Type	Dec	YTD
HVAC & Plumbing Contractors	40	423
HVAC Distributors	1	23
Retailers	0	36
New Construction	5	85
Total Number of Presentations/Visits	46	567

YTD 2009 Dayton Community Action Partnership - Homes Weatherized			
	Homes	Dollars	Unused Funds
TEEM I	274	\$1,122,677	\$154,631
TEEM II	282	\$1,131,339	\$295,836
Total	556	\$2,254,016	\$450,467

Measures	Endnotes	Measures Implemented				Incentive Expenditures				CCF Savings			
		Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal
Residential Prescriptive													
92 % AFUE Furnace		511	3,951	3,500	113%	\$102,200	\$790,200	\$700,000	113%	45,990	\$55,590	\$15,000	113%
Early Retirement Furnace		47	444	350	127%	\$9,400	\$88,800	\$70,000	127%	7,943	75,036	\$9,150	127%
.62 EF Storage Water Heater		99	1,345	1,000	135%	\$9,900	\$134,500	\$100,000	135%	1,584	21,520	16,000	135%
.82 EF Tankless Water Heater		24	241	200	121%	\$3,600	\$36,150	\$30,000	121%	1,512	15,183	12,600	121%
90% AFUE Boiler		17	71	100	71%	\$8,500	\$35,500	\$50,000	71%	1,377	5,751	8,100	71%
Subtotal		698	6,052	5,150	118%	\$133,600	\$1,085,150	\$950,000	114%	58,406	473,080	410,850	115%
Residential New Construction													
ES Cert - 85		0	0	10	0%	\$0	\$0	\$5,000	0%	0	0	2,080	0%
ES Cert - 70		12	73	65	112%	\$9,000	\$54,750	\$48,750	112%	4,992	30,368	27,040	112%
Subtotal		12	73	75	97%	\$9,000	\$54,750	\$53,750	102%	4,992	30,368	29,120	104%
Commercial Prescriptive													
92 % AFUE Furnace		8	83	150	55%	\$1,600	\$16,600	\$30,000	55%	1,520	15,770	28,500	55%
90% AFUE Commercial Boiler		4	42	100	42%	\$5,181	\$89,889	\$215,000	42%	4,907	\$8,372	128,000	46%
.62 EF Storage Water Heater		2	12	20	60%	\$200	\$1,200	\$2,000	60%	70	420	700	60%
.82 EF Tankless Water Heater		0	11	60	18%	\$0	\$1,650	\$9,000	18%	0	693	3,780	18%
.88 TE Water Heater		0	0	10	0%	\$0	\$0	\$7,500	0%	0	0	6,000	0%
Boiler Tune Up		0	0	60	0%	\$0	\$0	\$4,500	0%	0	0	25,800	0%
Subtotal		14	148	400	37%	\$6,981	\$109,339	\$268,000	41%	6,497	75,255	192,780	39%
Residential On-line Audit and Water Heating Kit													
Level 3 audits/kits		75	2,077	2,000	104%	\$1,020	\$28,247	\$70,000	40%	2,175	60,233	58,000	104%
Programmable Thermostat		7	32	15	213%	\$140	\$640	\$300	213%	245	1,120	525	213%
Subtotal		82	2,109	2,015	105%	\$1,160	\$28,887	\$70,300	41%	2,420	61,353	58,525	105%
Home Energy Savings Program - Home Performance Pilot-2009 Carryover													
Home audits		0	12	0	0%	\$0	\$48,420	\$48,420	100%	0	0	0	0%
DHW Direct Install		0	0	0	0%	\$0							
Air Sealing & Insulation		0	31	24	129%	\$0							
Subtotal	1	0	31	24	129%	\$0	\$48,420	\$48,420	100%	0	8,898	8,898	100%
Home Energy Savings Program - 2010													
Home audits		64	294	286	103%	\$0	\$1,495	\$2,565	58%	1,148	5,851	13,800	42%
DHW Direct Install		136	684	712	96%	\$0	\$1,495	\$2,565	58%	1,148	5,851	13,800	42%
Air Sealing & Insulation		14	33	100	33%	\$25,399	\$60,240	\$122,435	49%	4,408	11,291	16,200	70%
Subtotal		214	717	812	88%	\$25,399	\$61,735	\$125,000	49%	5,556	17,142	30,000	57%
Multi-Family Direct Install													
Units Completed		2,098	4,098	2,000	205%	\$25,176	\$49,176	\$24,000	205%	56,342	113,758	58,000	196%
School Education Program													
Think Energy Program		2,000	2,000	2,000	0%	\$0	\$0	\$0	0%	68,839	68,839	58,000	119%
Commercial Re-Commissioning Pilot													
Building audits		10	16	10	160%	N/A	N/A						
Proposals Implemented	2	0	3	10	30%	\$0	\$0	\$25,000	0%	0	29,140	10,000	291%
Commercial Custom													
Commercial Custom		0	0	5	0%	\$0	\$0	\$70,000	0%	0	0	46,880	0%
2010 Portfolio Totals		5,128	15,231	12,491	122%	\$201,317	\$1,437,457	\$1,634,470	88%	203,052	877,833	903,053	97%



December 2010 Scorecard - Ohio

Conservation Connection Call Center	DEC	YTD
Direct calls	269	3,258
Transferred calls	172	1,982
Total calls	441	5,240

Aclara Online Audit Tool	DEC	YTD
Total new users	1,203	16,388
Total unique users	3,975	57,696
Total return users	3,039	45,240

Dayton Community Action Partnership	DEC	DEC	YTD	YTD
Homes Weatherized	Homes	Dollars	Homes	Dollars
TEEM I	10	\$30,832	75	\$274,150
TEEM II	24	\$116,856	176	\$831,692
Total	34	\$147,688	251	\$1,105,842

Vectren Trade Ally Outreach	DEC	YTD
New construction	14	165
Commercial	7	112
HVAC/plumber	25	243
Supplier	2	34
Residential	1	31
Big box retailer	14	92
Total contacts	63	677

Vectren Presentations/Group Outreach	Attended
KMO Chamber Annula Breakfast Table Top	150
HBA Green Building Task Force	8
Total	158

Vectren Endnote Reference Guide		
Scorecard	#	Comments
January Scorecard	1	The Home Performance Program completed energy audits in 2009 but were unable to schedule the air sealing and insulation until 2010
July Scorecard	2	Audits were completed in 2009 however savings measures were not implemented until 2010

Measures	Endnotes	Measures Implemented				Incentive Expenditures				CCF Savings			
		Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal
Residential Prescriptive													
94% AFUE Furnace		0	903	2,000	143%	\$0	\$270,900	\$600,000	143%	0	92,106	204,000	143%
95% AFUE Furnace		392	1,958			\$117,600	\$587,400			39,984	199,716		
Early Retirement Furnace 94% AFUE		0	53	200	80%	\$0	\$15,900	\$60,000	80%	0	9,593	36,200	80%
Early Retirement Furnace 95% AFUE		13	105			\$3,900	\$31,800			2,353	19,186		
92% AFUE Furnace (2011 Carryover)	2	0	50	0	N/A	\$0	\$10,000	\$0	N/A	0	4,650	0	N/A
Early Retirement Furnace 92% AFUE (2011 Carryover)			0	3		0	\$0	\$600		\$0	0	510	
.62 EF Storage Water Heater		81	419	300	140%	\$4,050	\$20,950	\$15,000	140%	1,053	5,447	3,900	140%
.67 EF Water Heater		35	294	200	147%	\$5,250	\$44,100	\$30,000	147%	1,015	8,526	5,800	147%
.82 EF Tankless Water Heater		24	161	175	92%	\$3,600	\$24,150	\$26,250	92%	1,512	10,143	11,025	92%
Residential NG Boiler 90% AFUE		2	22	40	55%	\$1,000	\$11,000	\$20,000	55%	158	1,738	3,160	55%
Programmable Thermostat - Standard Incentive	3	211	1,695	700	243%	\$4,220	\$33,900	\$14,000	243%	6,752	54,240	22,400	243%
Programmable Thermostat - Below Incentive	1	1	7			\$18	\$131			32	224		
Subtotal		759	5,671	3,615	157%	\$139,638	\$1,050,831	\$765,250	137%	\$2,859	406,079	286,485	142%
Residential New Construction													
ES Cert 2.0 - 70		0	3	100	356%	\$0	\$2,250	\$75,000	356%	0	744	24,800	356%
ENERGY STAR Certification v2.5		50	319			\$37,500	\$239,250			12,400	79,112		
ENERGY STAR Certification v3.0		0	0			\$0	\$0			0	0		
Vectren Gold Star HERS <=70		9	34			\$6,750	\$25,500			2,232	8,432		
Subtotal		59	356	100	356%	\$44,250	\$267,000	\$75,000	356%	14,632	88,288	24,800	356%
Residential On-line Audit and Water Heating Kit													
Level 3 audits/kits	4, 5	0	2,017	2,000	101%	\$0	\$23,970	\$30,000	80%	0	29,650	29,400	101%
Programmable Thermostat (2011 Carryover)	3	0	1			\$0	\$20			0	32		
Subtotal		0	2,018	2,000	101%	\$0	\$23,990	\$30,000	80%	0	29,682	29,400	101%
Home Performance Program													
Audit		0	206	250	82%	\$0	\$44,263	\$58,630	75%				
DHW Direct Install		0	697	1,192	58%	\$0	\$7,197	\$21,238	34%	0	6,958	15,303	45%
Air Sealing & Insulation		8	50	90	56%	\$14,587	\$87,740	\$153,000	57%	2,587	17,332	31,320	55%
Subtotal		8	953	1,532	62%	\$14,587	\$139,200	\$232,868	60%	2,587	24,290	46,623	52%
Multi-Family Direct Install													
Units Completed		(4)	5,050	5,000	101%	(\$935)	\$48,272	\$50,000	97%	(99)	150,387	150,000	100%
School Education Program													
School Education Program		5	9,008	9,000	100%	\$0	\$0	\$0	N/A	(705)	134,340	135,000	100%
Commercial Prescriptive													
92% AFUE Furnace		20	117	100	117%	\$4,000	\$23,400	\$20,000	117%	3,700	21,645	18,500	117%
Commercial NG Boiler 90% AFUE		16	42	50	84%	\$48,060	\$145,210	\$107,500	135%	11,065	36,662	27,000	136%
.62 EF Storage Water Heater		1	5	20	25%	\$100	\$500	\$2,000	25%	16	80	320	25%
.82 EF Tankless Water Heater		0	5	15	33%	\$0	\$750	\$2,250	33%	0	325	975	33%
Boiler Tune Up		0	26	50	52%	\$0	\$3,399	\$7,500	45%	0	13,959	21,500	65%
Programmable Thermostat		65	164	50	328%	\$1,300	\$3,280	\$1,000	328%	2,080	5,248	1,600	328%
Subtotal		102	359	285	126%	\$53,460	\$176,539	\$140,250	126%	16,861	77,919	69,895	111%
Commercial Custom													
Audits		3	42	36	117%								
< 7500 Therms		0	0	8	38%	\$0	\$0	\$47,504	107%	0	0	50,000	102%
>=7500 Therms		0	3			\$0	\$51,034			0	51,034		
Subtotal		0	3	8	38%	\$0	\$51,034	\$47,504	107%	0	51,034	50,000	102%
Commercial Direct Install													
Units Completed	6	0	155	260	60%	\$0	\$55,889	\$80,305	70%	0	149,151	130,000	115%
Other Outreach													
Greening Greenfield - Kits		0	142	250	57%	\$0	\$0	\$0	0%	0	4,260	4,260	100%
2012 Portfolio Totals		921	22,826	20,518	111%	\$251,001	\$1,312,755	\$1,421,777	128%	\$6,135	1,115,429	\$1,212,203	121%

Vector Endnote Reference Guide		
Scorecard	#	Comments
March	1	Boiler Tune Up Ccf Savings has been updated on May scorecard.
April	2	Addition of 6 Storage Water Heaters omitted from March scorecard (paid on March invoice).
July	3	Adjusted participation goal from 1,500 to 1,000
July	4	Adjusted participation goal from 150 to 100
July	5	Adjusted participation goal from 1,800 to 1,400. Per unit Ccf savings updated from 90 to 93 effective 7-01-11 as a result of EM&V. June scorecard totals: 1,032 units, 92,880 Ccf
July	6	Adjusted participation goal from 180 to 140. Per unit Ccf savings updated from 169 to 170 effective 7-01-11 as a result of EM&V. June scorecard totals: 97 units, 16,393 Ccf
July	7	Adjusted participation goal from 1,000 to 500. Per unit Ccf savings updated from 16 to 13 effective 7-01-11 as a result of EM&V. June scorecard totals: 157 units, 2,192 Ccf
July	8	Adjusted participation goal from 50 to 100
July	9	Per unit Ccf savings updated from 81 to 79 effective 7-01-11 as a result of EM&V. June scorecard totals: 32 units, 2,592 Ccf
July	10	Measure added to residential and commercial prescriptive programs effective 7-01-11. Measure removed from online audit kit promotion effective with kits mailed after 7-01-11
July	11	Per unit Ccf savings updated from 416 to 248 effective 7-01-11 as a result of EM&V. June scorecard totals: 13 units, 3,328 Ccf
July	12	Per unit Ccf savings updated from 190 to 185 effective 7-01-11 as a result of EM&V. June scorecard totals: 77 units, 14,630 Ccf
July	13	Per unit Ccf savings updated from 35 to 16 effective 7-01-11 as a result of EM&V. June scorecard totals: 5 units, 175 Ccf
July	14	Per unit Ccf savings updated from 63 to 65 effective 7-01-11 as a result of EM&V. June scorecard totals: 5 units, 315 Ccf
July	15	Adjusted participation from 2,000 to 3,000. Kit savings updated from 29 to 30 Ccf with a 49% realization rate is effective 7-01-11 as a result of EM&V. June scorecard totals: 1,438 units 41,702 Ccf. July-Dec goal 1,562 kits, 30 Ccf, 49%, 22,961. Goal adjusted from 58,000 to 64,663.
July	16	Adjusted participation goal from 4,000 to 6,000
July	17	Adjusted participation from 8,000 to 9,000. Adjusted Ccf savings from 232,000 to 162,000 - 9,000 kits at a 60% installation rate using 30 Ccf per kit
July	18	Per unit Ccf savings updated from 15.66 to 15.82 for Showerhead, 6.38 to 3.03 for Kitchen Aerator and 3.48 to 5.93 for Bath Aerator effective 7-01-11 as a result of EM&V. Overall goals for program not adjusted at this time
August	19	Adjusted YTD numbers due to duplicate rebate issued in July and also incorrect July monthly numbers and Ccf savings. Measures implemented reduced by 3, Incentive expenditures reduced by \$600, Ccf savings reduced by 279.
September	20	Adjusted YTD numbers due to overcounting of units and measures from June. Adjusted participation from 6,215 to 6,091. Adjusted Ccf savings from 174,573 to 169,117. Adjusted Incentive Expenditures from \$74,580 to \$73,092.
October	21	Now realizing only Audits in portfolio measures total. Do not want to double count homes that receive both an audit and the DHW measures. Incentive Expenditures and Ccf savings will continue to count Audits, DHW and Air Sealing & Insulation in their totals.
October	22	Adjusted goals based on revised contract in October of achieving more Ccf savings. New goals: \$77,738 Incentive Expenditures and 125,088 Ccf savings.



December 2011 Scorecard - Ohio

Conservation Connection Call Center	December	YTD
Direct calls	204	4,247
Transferred calls	60	1,123
Total calls	264	5,370

Aclara Online Audit Tool	December	YTD
Total new users	1,098	13,112
Total unique users	3,263	40,163
Total return users	2,368	30,567

Dayton Community Action Partnership Homes Weatherized	December Homes	December Dollars	YTD Homes	YTD Dollars
TEEM I	4	\$27,595	144	\$592,945
TEEM II	0	\$0	567	\$2,629,593
Total	4	\$27,595	711	\$3,222,538

Vectren Trade Ally Outreach	December	YTD
Builders/Developers	8	183
Plumbers	2	179
Commercial	16	222
HVAC	20	384
Government	12	22
Other	0	41
Mechanical Contractor	5	111
Wholesaler	7	135
Engineer Contractor	2	33
Retailer/Big Box	13	128
Total contacts	85	1,438

Vectren Presentations/Group Outreach	Attended
IMFA	12
KMO Chamber	150
Total	162

Measures	Endnotes	Measures Implemented				Incentive Expenditures				CCF Savings			
		Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal
Residential Prescriptive													
94% AFUE Furnace	3	336	2,039	1,000	204%	\$100,800	\$611,700	\$300,000	204%	34,272	207,978	102,000	204%
Early Retirement Furnace 94% AFUE	4	20	163	100	163%	\$6,000	\$48,900	\$30,000	163%	3,620	29,503	18,100	163%
92% AFUE Furnace	5, 19	13	1,235	1,400	88%	\$2,600	\$247,000	\$280,000	88%	1,206	111,756	127,104	88%
Early Retirement Furnace 92% AFUE	6	1	108	140	77%	\$200	\$21,600	\$28,000	77%	170	18,263	23,703	77%
.62 EF Storage Water Heater	2	0	105			\$0	\$10,500			0	1,680		
.62 EF Storage Water Heater (PY 2011)	7	46	298	500	81%	\$2,300	\$14,900	\$25,000	102%	598	4,285	7,226	83%
.67 EF Water Heater	8	20	170	100	170%	\$3,000	\$25,500	\$15,000	170%	580	4,930	2,900	170%
.82 EF Tankless Water Heater		16	173	225	77%	\$2,400	\$25,950	\$33,750	77%	1,008	10,899	14,175	77%
Residential NG Boiler 90% AFUE	9	0	39	50	78%	\$0	\$19,500	\$25,000	78%	0	3,145	4,014	78%
Programmable Thermostat	10	195	834	1,000	83%	\$9,900	\$16,680	\$20,000	83%	6,240	26,688	32,000	83%
Subtotal		647	5,164	4,515	114%	\$121,200	\$1,042,230	\$756,750	138%	47,694	419,127	331,222	127%
Residential New Construction													
ES Cert - 85		0	1			\$0	\$500			0	208		
ES Cert 2.0 - 70		0	11	70	107%	\$0	\$8,250	\$52,500	107%	0	4,072	19,336	106%
ES Cert 2.5 - 70		24	52			\$18,000	\$39,000			5,952	13,064		
Gold Star HERS <=70		1	11			\$750	\$8,250			248	3,232		
Subtotal	11	25	75	70	107%	\$18,750	\$56,000	\$52,500	107%	6,200	20,576	19,336	106%
Commercial Prescriptive													
92% AFUE Furnace	12	9	99	125	79%	\$1,800	\$19,800	\$25,000	79%	1,665	18,700	23,510	80%
Commercial NG Boiler 90% AFUE		6	47	50	94%	\$21,540	\$149,796	\$107,500	139%	5,158	66,145	61,345	108%
.62 EF Storage Water Heater	13	2	9	20	45%	\$200	\$900	\$2,000	45%	32	239	415	58%
.82 EF Tankless Water Heater	14	0	6	25	24%	\$0	\$900	\$3,750	24%	0	380	1,615	24%
Boiler Tune Up	1	2	19	50	38%	\$265	\$3,104	\$7,500	41%	1,716	10,361	21,500	48%
Programmable Thermostat	10	1	5	75	7%	\$20	\$100	\$1,500	7%	32	160	2,400	7%
Subtotal		20	185	345	54%	\$23,845	\$174,600	\$147,250	119%	8,603	95,985	110,785	87%
Residential On-line Audit and Water Heating Kit													
Level 3 audits/kits	15	39	2,964			\$530	\$40,310			573	64,134		
Programmable Thermostat	10	0	10	3,000	99%	\$0	\$200	\$105,000	39%	0	338	64,663	100%
Subtotal		39	2,974	3,000	99%	\$530	\$40,510	\$105,000	39%	573	64,472	64,663	100%
Home Performance Program													
Audit	18, 21	0	274	275	100%								
DHW Direct Install		0	746	688	108%	\$0	\$1,255	\$2,700	46%	0	6,172	5,739	108%
Air Sealing & Insulation		14	108	100	108%	\$21,657	\$165,155	\$135,000	122%	5,190	31,917	30,000	106%
Subtotal		14	1,128	1,063	106%	\$21,657	\$166,410	\$137,700	121%	5,190	38,089	35,739	107%
Multi-Family Direct Install													
Units Completed	16,18,20	0	6,091	6,090	102%	\$0	\$73,092	\$72,900	102%	0	169,117	174,000	97%
School Education Program													
School Education Program	17	9,224	9,224	9,000	102%	\$0	\$0	\$0	0%	168,516	168,516	162,000	104%
Commercial Re-Commissioning													
Building audits		0	13	10	130%								
Proposals Implemented		0	0			\$0	\$0	\$0	0%	0	0	10,000	0%
Subtotal		0	13	10	130%	\$0	\$0	\$0	0%	0	0	10,000	0%
Commercial On-Site													
< 7500 Therms		1	5	5	160%	\$2,630	\$5,547			3,506	7,960	46,880	93%
>=7500 Therms		0	3			\$0	\$35,519	\$70,000	59%	0	35,519		
Subtotal		1	8	5	160%	\$2,630	\$41,066	\$70,000	59%	3,506	43,379	46,880	93%
Commercial Direct Install													
Units Completed	22	15	103	200	52%	\$20,572	\$72,132	\$77,738	93%	\$1,446	129,949	125,088	104%
2011 Portfolio Totals		9,971	24,101	23,420	103%	\$209,184	\$1,666,040	\$1,041,938	157%	270,743	2,149,211	1,639,913	136%

Vectren Endnote Reference Guide		
Scorecard	#	Comments
January	1	In December 2011, there were three "below incentive" residential programmable thermostats that were not accounted for in the measures, incentives and Ccf savings. We have added those measures and their incentives and savings to January's scorecard.
April	2	In April 2012, it was realized that a residential furnace that had previously been counted as a 92% AFUE should have been rebated as a 94% or higher AFUE furnace (it was a 95% AFUE furnace installed prior to April 1st, 2012). The correction has been made by WECC. WECC recognized the loss of 93 Ccfs in the 92% AFUE category in April, and instead will realize 102 Ccfs in the 94% AFUE furnace in May.
September	3	After the August scorecard was finalized it was realized that 33 programmable thermostats were entered under the wrong program measure by the rebate fulfillment contractor. The 33 measures appeared incorrectly on the August scorecard under the Residential On-Line Audit Kit Program in the YTD measure column as well as the MTD and YTD incentives (\$660) and Ccf Savings (1,056). These measures should have been entered under the Residential Prescriptive Program and were corrected on the September scorecard in the YTD totals for the Programmable Thermostat.
November	4	Recognized true YTD incentive amount in November. Discount provided on number of kits shipped, due to high quantity.
November	5	Made exception for one customer in month of November.
November	6	Additional Ccf savings realized in month of November, after program end. Retroactive savings increase to Pre Rinse Spray Valves and Aerators installed during 2012 program. PRSV savings value changed from 122.6 to 184.4 for all PRSV installed in 2012. Kitchen Aerators savings value changed from 49.8 to 121.06 and Faucet Aerators savings value changed from 5.4 to 13.13 for some of the measures installed in 2012. Higher GPM Aerators were installed halfway through program year.

Conservation Connection Call Center	December	YTD
Direct calls	262	3,268
Transferred calls	32	467
Total calls	294	3,735

Aclara Online Audit Tool	December	YTD
Total new users	362	10,906
Total unique users	1,149	36,539
Total return users	851	28,059

Trade Ally Outreach	December	YTD
Builders/Developers	2	165
Plumbers	1	52
Commercial	14	272
HVAC	1	128
Government	0	6
Other	0	0
Mechanical Contractor	2	57
Wholesaler	1	58
Engineer Contractor	0	47
Retailer/Big Box	0	20
Total contacts	21	805

Dayton CAP Homes Weatherized	December Homes	YTD Homes	Forecasted Homes thru December	2012 Planning Goal Homes
TEEM I	16	229	221	221
TEEM II	0	168	203	203
Total	16	397	424	424

Presentations/Group Outreach	Attended
Total	0

Portfolio Budget*

DSM Programs	Original Budget	Nov-12	YTD	% of YTD Actual to Budget
Residential Prescriptive	\$ 1,035,671	\$ 128,215	\$ 1,135,932	110%
Residential On-Line Audit/Kits	\$ 152,708	\$ 26,777	\$ 124,791	82%
Residential New Construction	\$ 95,184	\$ 46,800	\$ 252,926	266%
Residential Home Performance	\$ 439,678	\$ 27,493	\$ 278,031	63%
Multi-Family Direct Install	\$ 274,962	\$ 15,881	\$ 269,998	98%
School Education	\$ 209,778	\$ 6,859	\$ 116,991	56%
Commercial Prescriptive	\$ 241,698	\$ 20,514	\$ 189,003	78%
Commercial Custom	\$ 195,954	\$ 1,641	\$ 108,549	55%
Commercial Direct Install	\$ 256,785	\$ 3,611	\$ 229,626	89%
Program Outreach and Education	\$ 450,000	\$ 91,643	\$ 425,606	95%
DSM Program Portfolio Total	\$3,352,418	\$ 369,434	\$3,131,453	93%
TEEM I	\$1,103,531	\$ 177,984	\$1,040,933	94%
TEEM II	\$1,013,424	\$ 70,603	\$ 964,291	95%

*Reported on a one month lag

Measures	Endnotes	Measures Implemented				Incentive Expenditures				CCF Savings			
		Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal
Residential Prescriptive													
95% AFUE Furnace (1/1/13 - 4/30/13)	2	2	1,447	775	187%	\$600	\$434,100	\$232,500	187%	224	162,064	\$6,800	187%
Early Retirement Furnace 95% AFUE (1/1/13 - 4/30/13)		0	77	50	154%	\$0	\$23,100	\$15,000	154%	0	15,246	9,900	154%
95% AFUE Furnace (5/1/13 - 12/31/13)		317	1,624	1,850	88%	\$63,400	\$324,800	\$370,000	88%	35,504	181,888	207,200	88%
Early Retirement Furnace 95% AFUE (5/1/13 - 12/31/13)		2	52	90	58%	\$400	\$10,400	\$18,000	58%	396	10,296	17,820	58%
.62 EF Storage Water Heater (2012 Carryover)		0	177	153	116%	\$0	\$8,850	\$7,650	116%	0	2,301	1,989	116%
.67 EF Water Heater (2012 Carryover)		0	49	105	47%	\$0	\$7,350	\$15,750	47%	0	1,421	3,045	47%
.82 EF Tankless Water Heater (2012 Carryover)		0	39	52	75%	\$0	\$5,850	\$7,800	75%	0	2,457	3,276	75%
Residential NG Boiler 90% AFUE	1	3	31	22	141%	\$1,500	\$15,350	\$11,000	140%	237	2,386	1,738	137%
Programmable Thermostat - Standard Incentive		222	1,991	1,413	141%	\$4,440	\$39,820	\$28,260	141%	7,113	63,792	45,216	142%
Programmable Thermostat - Below Incentive		0	6			\$0	\$101			0	192		
Subtotal		546	5,493	4,510	122%	\$70,340	\$869,721	\$705,960	123%	43,474	442,043	376,984	117%
Residential New Construction													
ES Cert 2.0 - 70 (2012 Carryover)		0	0			\$0	\$0			0	0		
ENERGY STAR Certification v2.5 (2012 Carryover)		0	133	158	111%	\$0	\$99,750	\$118,500	111%	0	32,984	39,184	111%
ENERGY STAR Certification v3.0 (2012 Carryover)		0	0			\$0	\$0			0	0		
Vectra Gold Star HERS <=70 (2012 Carryover)		0	43			\$0	\$32,250			0	10,664		
Subtotal		0	176	158	111%	\$0	\$132,000	\$118,500	111%	0	43,648	39,184	111%
Residential On-line Audit and Water Heating Kit													
Level 3 audits/kits		0	501	500	100%	\$0	\$5,812	\$7,500	77%	0	7,365	7,350	100%
Subtotal		0	501	500	100%	\$0	\$5,812	\$7,500	77%	0	7,365	7,350	100%
Home Insulation Pilot Program													
Air Sealing		34	234	360	65%	\$8,505	\$55,470	\$72,000	77%	3,468	23,868	36,720	65%
Attic Insulation		36	241	320	75%	\$19,581	\$129,713	\$144,000	90%	3,888	26,028	34,560	75%
Wall Insulation		13	85	200	43%	\$6,102	\$42,099	\$100,000	42%	1,625	10,625	25,000	43%
Trade Ally Co-op Incentive		-	-	-	-	\$0	\$1,725	\$25,000	7%	-	-	-	-
Subtotal		83	560	880	64%	\$34,189	\$229,007	\$341,000	67%	8,981	60,521	96,280	63%
Multi-Family Direct Install													
Units Completed		0	1,724	1,500	115%	\$0	\$48,523	\$54,000	90%	0	111,089	106,560	104%
School Education Program													
School Education Program		0	9,064	9,000	101%	\$0	\$0	\$0	0%	0	151,067	150,000	101%
Commercial Prescriptive													
92% AFUE Furnace		9	100	105	95%	\$1,800	\$20,000	\$21,000	95%	1,665	18,500	19,425	95%
Commercial NG Boiler 90% AFUE		22	54	33	164%	\$45,614	\$147,458	\$70,950	208%	3,465	39,133	25,905	151%
.62 EF Storage Water Heater (2012 Carryover)		0	3	2	150%	\$0	\$300	\$200	150%	0	48	32	150%
.82 EF Tankless Water Heater (2012 Carryover)		0	3	2	150%	\$0	\$450	\$300	150%	0	195	130	150%
Boiler Tune Up		13	30	43	70%	\$2,825	\$5,558	\$6,450	86%	4,456	11,173	17,200	65%
Programmable Thermostat		14	76	32	238%	\$280	\$1,520	\$640	238%	449	2,435	1,024	238%
Subtotal		58	266	217	123%	\$50,519	\$175,287	\$99,540	176%	15,034	71,485	63,716	112%
Commercial Custom													
Audits		0	34	40	85%								
<7500 Therms	3	0	4	6	100%	\$0	\$14,834	\$35,628	78%	0	19,779	60,000	59%
>=7500 Therms		0	2	6		\$0	\$12,880			0	15,727		
Subtotal		0	6	6	100%	\$0	\$27,714	\$35,628	78%	0	35,506	60,000	59%
2013 Portfolio Totals													
		638	17,464	16,251	107%	\$155,048	\$1,488,064	\$1,362,328	109%	67,489	922,723	906,074	103%

Vectren Endnote Reference Guide		
Scorecard	#	Comments
February	1	One Residential Boiler measure was initially processed in November 2012 as a tankless water heater. The incremental incentive (\$350) and incremental Ccf savings (16) is being recognized in February 2013 under the Residential Boiler measure.
September	2	Nine measures transferred from the Residential 95% AFUE Furnace - Installed After May 1 measure and transferred to the Residential 95% AFUE Furnace - Installed Before May 1 measure based on installation date, resulting in the transfer of \$1,800 in
December	3	WECC overpaid custom project by \$1,782.96, credit to Vectren occurred in December.

Conservation Connection Call Center	December	YTD
Direct calls	213	2,791
Transferred calls	23	408
Total calls	236	3,199

Aclara Online Audit Tool	December	YTD
Total new users	229	3,935
Total unique users	947	13,330
Total return users	785	10,320

Trade Ally Outreach	December	YTD
Builders/Developers	12	216
Plumbers	3	49
Commercial	21	327
HVAC	2	208
Government	0	2
Other	0	0
Mechanical Contractor	3	53
Wholesaler	1	37
Engineer Contractor	1	56
Retailer/Big Box	0	16
Total contacts	43	964

Dayton CAP Homes Weatherized	December Homes	YTD Homes	Forecasted Homes thru December	2013 Total Forecasted Homes
TEEM I	62	231	179	179
TEEM II	27	169	161	161
Total	89	400	340	340

Presentations/Group Outreach	Attended
Dayton Home Builders	150
Total	150

Portfolio Budget*

DSM Programs	Original Budget	Nov-13	YTD	% of YTD Actual to Budget
Residential Prescriptive	\$ 891,298	\$ 69,035	\$ 999,378	112%
Residential On-Line Audit/Kits	\$ 83,572	\$ 31,980	\$ 79,649	95%
Residential New Construction	\$ 121,870	\$ -	\$ 135,711	111%
Home Insulation Pilot	\$ 752,882	\$ 82,872	\$ 555,469	74%
Multi-Family Direct Install	\$ 204,207	\$ 15,239	\$ 203,243	100%
School Education	\$ 231,883	\$ (29,722)	\$ 147,259	64%
Commercial Prescriptive	\$ 186,657	\$ 14,409	\$ 198,123	106%
Commercial Custom	\$ 222,209	\$ 3,002	\$ 135,768	61%
Program Outreach and Education	\$ 400,000	\$ 48,492	\$ 333,231	83%
DSM Program Portfolio Total	\$3,094,577	\$235,308	\$2,787,831	90%
TEEM I	\$1,116,060	\$137,522	\$ 914,678	82%
TEEM II	\$1,005,608	\$126,827	\$ 833,328	83%

*Reported on a one-month lag

Measures	Endnotes	Measures Implemented				Incentive Expenditures				CCF Savings				Nov-14
		Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	% to Goal
Residential Prescriptive														
95% AFUE Furnace - Existing Construction		327	2,770	2,900	96%	\$65,400	\$554,000	\$580,000	96%	38,586	326,860	342,200	96%	84%
95% AFUE Furnace - New Construction	1	39	433	250	173%	\$7,800	\$86,000	\$50,000	172%	4,095	45,465	26,250	173%	158%
Residential NG Boiler 90% AFUE		2	22	30	73%	\$1,000	\$11,000	\$15,000	73%	158	1,738	2,370	73%	67%
Programmable Thermostat - Standard Incentive		202	1,859	1,425	131%	\$4,040	\$37,180	\$28,500	131%	6,472	59,563	45,657	131%	116%
Programmable Thermostat - Below Incentive		0	2			\$0	\$33			0	64			
Subtotal		570	5,086	4,605	110%	\$78,240	\$688,213	\$673,500	102%	49,311	433,690	416,477	104%	92%
Residential Home Insulation and Air Sealing														
Air Sealing and Insulation Jobs		49	523	400	131%	\$48,903	\$514,669	\$351,200	147%	12,665	134,438	92,000	146%	132%
Direct Install Measures (Showerheads, Tstats, Aerators)	2	4	45	160	28%	\$120	\$1,350	\$4,800	28%	142	2,176	10,000	22%	20%
Subtotal		49	523	400	131%	\$49,023	\$516,019	\$356,000	145%	12,807	136,614	102,000	134%	121%
Multi-Family Direct Install														
Units Completed		606	2,314	1,000	231%	\$0	\$39,568	\$41,500	95%	27,869	107,807	76,946	140%	104%
Mobile Home Direct Install														
Units Completed		2	421	750	56%	\$108	\$8,637	\$8,625	100%	302	63,414	93,955	67%	67%
School Education Program														
School Education Program		0	9,298	9,000	103%	\$0	\$0	\$0	0%	0	154,967	150,000	103%	103%
Commercial Prescriptive														
92% AFUE Furnace		4	58	60	97%	\$800	\$11,600	\$12,000	97%	740	10,730	11,100	97%	90%
Commercial NG Boiler 90% AFUE		1	21	30	70%	\$5,000	\$62,500	\$90,000	69%	1,392	14,847	25,290	59%	53%
Boiler Tune Up		5	16	30	53%	\$1,250	\$2,871	\$4,500	64%	3,633	7,142	12,000	60%	29%
Programmable Thermostat (Carryover from 2013)		0	17	-	-	\$0	\$340	-	-	0	545	-	-	
Subtotal		10	112	120	93%	\$7,050	\$77,310	\$106,500	73%	5,765	33,264	48,390	69%	57%
Commercial Custom														
Audits		0	25	-	-									
< 7500 Therms	3	0	4	5	120%	\$0	\$7,090	\$25,000	116%	0	7,725	30,000	117%	117%
>= 7500 Therms		0	2			\$0	\$22,026			0	27,437			
Subtotal		0	6	5	120%	\$0	\$29,116	\$25,000	116%	0	35,162	30,000	117%	117%
2014 Portfolio Totals		1,237	17,760	15,880	112%	\$134,421	\$1,358,863	\$1,211,125	112%	96,054	964,918	917,768	105%	95%

Vectren Endnote Reference Guide		
Scorecard	#	Comments
May	1	Builder only charged \$150 per furnace upgrade on the invoice therefore only received \$150 rebate instead of \$200.
July	2	CSG found and corrected some data discrepancies in June related to Direct Install Measures. Current and YTD numbers have been adjusted to reflect the actual numbers provided by CSG in the 7/31/14 production report.
August	3	July scorecard reported 302 ccfs that could not be completed by the customer due to manufacturer's recommendation not to insulate a small portion of uninsulated pipe to the boiler return from the boiler feed pump.

Conservation Connection Call Center	December	YTD
Direct calls	211	2,255
Transferred calls	234	1,110
Total calls	445	3,365

Aclara Online Audit Tool	December	YTD
Total new users	296	2,996
Total unique users	675	9,064
Total return users	546	7,066

Dayton CAP Homes Weatherized	December Homes	YTD Homes	Forecasted Homes thru December	2014 Total Forecasted Homes
TEEM I	0	172	181	181
TEEM II	0	134	162	162
Total	0	306	343	343

Trade Ally Outreach	December	YTD
Builders/Developers	16	220
Plumbers	2	37
Commercial	25	322
HVAC	8	179
Government	0	0
Other	0	0
Mechanical Contractor	5	74
Wholesaler	2	25
Engineer Contractor	6	64
Retailer/Big Box	0	0
Total contacts	64	921

Presentations/Group Outreach	Attended
Total	0

DSM Programs	Original Budget	Nov-14	Dec-14	YTD	% of YTD Actual to Budget
Residential Prescriptive	\$892,390	\$8,169	\$17,054	\$895,446	100%
Residential Home Insulation and Air Sealing	\$821,100	\$69,379	\$83,995	\$933,425	114%
Multi-Family Direct Install	\$180,086	\$3,769	\$16,383	\$184,330	102%
School Education	\$240,188	\$1,699	\$17,743	\$229,821	96%
Mobile Home Direct Install (New)	\$171,019	\$9,118	\$21,983	\$153,845	90%
Commercial Prescriptive	\$194,269	\$4,168	\$5,164	\$203,969	105%
Commercial Custom	\$134,043	\$3,719	\$16,011	\$135,031	101%
Program Outreach and Education	\$400,000	\$45,889	\$21,818	\$230,530	58%
Aclara Licensing Fees	\$64,000	-\$1,096	\$0	\$63,720	100%
DSM Program Portfolio Total	\$3,097,095	\$144,815	\$200,151	\$3,030,117	98%
TEEM I	\$1,100,000	\$13,963	\$18,613	\$1,105,003	100%
TEEM II	\$1,000,000	\$83,664	\$6,027	\$993,748	99%

December 2015 Scorecard - Ohio

Measures	Endnotes	Measures Implemented				Budget Expenditures				CCF Savings			
		Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal	Current Month	Program YTD	Planning Goal	% to Goal
Residential Prescriptive													
Furnace Replacement 95 - 96.99% AFUE		342	2,256	2,650	85%	-\$55,771	\$1,040,615	\$892,984	117%	40,356	266,208	312,700	85%
Furnace Replacement > 97% AFUE (New)		61	487	150	325%					7,612	60,768	18,717	325%
New Construction Furnace >95% AFUE		16	186	350	53%					1,680	19,530	36,750	53%
Boiler Replacement >95%		6	22	25	88%					675	2,473	2,811	88%
Wi-Fi Enabled Thermostat (New)		343	1,936	50	3872%					28,881	163,011	4,210	3872%
Programmable Thermostat		99	892	1,550	58%					3,172	28,580	49,662	58%
Subtotal		867	5,779	4,775	121%					82,375	540,570	424,850	127%
Residential Home Insulation and Air Sealing													
Air Sealing and Insulation Jobs	2	17	406	445	91%	\$69,149	\$841,623	\$883,813	95%	5,889	125,708	125,774	100%
Direct Install Measures (Showerheads, Tstats, Aerators)		2	45	89	51%					79	1,934	7,523	26%
Subtotal		17	406	445	91%					5,968	127,642	133,297	96%
Home Audit and Weatherization Pilot (New)													
Home Audits and Direct Install Measures		24	218	200	109%	\$30,597	\$268,411	\$289,759	93%	558	4,755	2,536	188%
Air Sealing, Insulation, Duct Sealing Projects		15	73	80	91%					5,444	28,045	32,432	86%
Subtotal		24	218	200	109%					6,002	32,800	34,968	94%
Multi-Family Direct Install													
Subtotal	1	0	1,052	1,000	105%	\$17,579	\$160,947	\$178,605	90%	0	34,874	33,240	105%
School Education Program													
School Education Program		340	9,002	9,000	100%	\$23,449	\$279,132	\$305,464	91%	5,667	150,033	150,000	100%
Commercial Prescriptive													
Furnace Replacement 92 - 94.99% AFUE		1	3	20	15%	\$3,722	\$112,524	\$114,008	99%	174	403	2,186	18%
Furnace Replacement >95% AFUE (New)		9	69	50	138%					1,730	10,531	6,750	156%
Commercial Boiler		2	45	20	225%					1,515	50,743	16,064	316%
Boiler Tune Up		5	10	23	43%					1,406	2,202	5,941	37%
Subtotal		17	127	113	112%					4,825	63,879	30,941	206%
Commercial Custom													
Audits		2	10	-	-	\$29,598	\$113,189	\$143,504	79%	2,746	4,456	40,000	11%
< 7500 Therms		1	2	6	33%								
>=7500 Therms		0	0										
Subtotal		0	2	6	33%								
2015 Program Totals		1,265	16,586	15,539	107%	\$118,323	\$2,816,441	\$2,808,137	100%	107,582	954,255	847,296	113%
Portfolio Level Costs													
Mobile Home Direct Install (Carryover from 2014)						\$0	\$6,588	\$0	-				
Program Outreach and Education						\$42,999	\$318,121	\$375,000	85%				
Aclara Licensing Fees						\$5,580	\$69,602	\$64,000	109%				
Unaccrued 2014 Expense, Paid in 2015, Recovered in 2014						\$0	-\$96,239	\$0	-				
DSM Program Portfolio Total	3	1,265	16,586	15,539	107%	\$166,902	\$3,114,513	\$3,247,137	96%	107,582	954,255	847,296	113%

December 2015 Scorecard - Ohio

Vectren Endnote Reference Guide		
Scorecard	#	Comments
July	1	Some units completed in June were reported in July. Final number of completed units is 1052.
October	2	The vendor's reporting database was not using the correct evaluated savings values. Actual YTD savings through October is 111,320 Ccf, as shown, an additional 17,418 ccf is being claimed based on evaluated savings.
December	3	Total actual recoverable cost for 2015 is \$3,114,513. Unaccrued November 2014 invoice was paid in 2015, but will be recovered under the 2014 rider. (\$3,210,752 - \$96,239 = \$3,114,513)

Conservation Connection Call Center	Dec	YTD
Direct calls	231	2,407
Transferred calls	95	1,705
Total calls	326	4,112

Aclara Online Audit Tool	Dec	YTD
Unique Account Visits	517	6,241
Total New Users	222	2,554

Presentations/Group Outreach	Attended
Total	0

Trade Ally Outreach	Dec	YTD
Builders/Developers	29	321
Plumbers	2	13
Commercial	24	310
HVAC	5	90
Government	0	0
Other	0	0
Mechanical Contractor	0	25
Wholesaler	2	28
Engineer Contractor	7	77
Retailer/Big Box	0	21
Total contacts	69	885

Dayton CAP Homes Weatherized	Dec Homes	YTD Homes	Forecasted Homes thru December	2015 Total Forecasted Homes	Dec Budget	YTD Budget	2015 Total Budget
TEEM I	21	238	163	163	\$118,888	\$1,099,090	\$1,120,016
TEEM II	14	148	125	125	\$109,165	\$941,502	\$1,016,244
Total	35	386	288	288	\$228,053	\$2,040,592	\$2,136,260

December 2016 Scorecard - Vectren Ohio



	Measures Implemented				Gross CCF Savings				Program Expenditures			
	Current Month (Dec)	YTD	Planning Goal	% to Goal	Current Month (Dec)	YTD	Planning Goal	% to Goal	Current Month (Dec)	YTD	Planning Goal	% to Goal
Residential Programs												
Residential Prescriptive Program												
Furnace 95%	358	2,534	2,500	101%	43,211	305,854	301,750	101%				
Furnace 97%	43	502	400	126%	5,479	63,968	50,970	126%				
New Construction Furnace 97%	0	34	125	27%	0	3,819	14,039	27%				
Boiler 95%	4	30	25	120%	450	3,373	2,811	120%				
Programmable Thermostat	108	741	500	148%	3,460	23,742	16,020	148%				
Wi-Fi Thermostat	517	2,928	1,700	172%	35,608	201,662	117,085	172%				
Residential Prescriptive Subtotal	1,030	6,769	5,250	129%	88,208	602,416	502,675	120%	\$ 152,217	\$ 1,370,238	\$ 1,239,222	111%
Residential Home Insulation	70	544	535	102%	19,990	154,178	154,691	100%	\$ 122,590	\$ 1,006,917	\$ 975,880	103%
Multi-Family Direct Install	0	2,360	1,500	157%	0	121,328	108,887	111%	\$ 12,369	\$ 314,179	\$ 285,248	110%
Schools	170	9,102	9,000	101%	2,833	151,700	150,000	101%	\$ 18,059	\$ 308,149	\$ 398,077	77%
UD-EEP (New)	0	0	250	0%	0	0	20,549	0%	\$ 705	\$ 8,445	\$ 49,928	17%
Total Residential	1,270	18,775	16,535	114%	111,031	1,029,620	936,802	110%	\$ 305,940	\$ 3,007,928	\$ 2,948,356	102%
Commercial Programs												
Commercial Prescriptive Program												
Furnace 92% (2015 carryover)	0	1	0	-	0	97	0	-				
Furnace 95%	10	114	60	190%	1,451	15,031	6,876	219%				
Furnace 97% (New)	1	2	10	20%	207	310	1,280	24%				
Boiler - Commercial Prescriptive	5	22	30	73%	8,629	29,612	24,096	123%				
Boiler Tune-Up	1	12	15	80%	364	2,771	3,875	72%				
Wi-Fi Thermostat (New)	10	41	60	68%	784	3,212	4,701	68%				
Steam Traps - Low Pressure (New)	0	0	10	0%	0	0	720	0%				
Steam Traps - Dry Cleaners (New)	0	0	15	0%	0	0	6,795	0%				
Commercial Prescriptive Subtotal	27	192	200	96%	11,435	51,034	48,343	106%	\$ 2,380	\$ 155,415	\$ 161,447	96%
Commercial Custom	1	6	6	100%	1,783	20,489	24,000	85%	\$ 27,939	\$ 111,245	\$ 115,500	96%

December 2016 Scorecard - Vectren Ohio



	Measures Implemented				Gross CCF Savings				Program Expenditures			
	Current Month (Dec)	YTD	Planning Goal	% to Goal	Current Month (Dec)	YTD	Planning Goal	% to Goal	Current Month (Dec)	YTD	Planning Goal	% to Goal
Total Commercial	28	198	206	96%	13,218	71,524	72,343	99%	\$ 30,318	\$ 266,659	\$ 276,947	96%
Total Residential & Commercial	1,298	18,973	16,741	113%	124,249	1,101,144	1,009,145	109%	\$ 336,258	\$ 3,274,587	\$ 3,225,303	102%
Program Outreach and Education									\$ 47,556	\$ 175,858	\$ 375,000	47%
Online Tool Licensing Fees									\$ -	\$ 66,741	\$ 64,000	104%
Carryover from 2015									\$ (0)	\$ 698	\$ -	-
Portfolio Total	1,298	18,973	16,741	113%	124,249	1,101,144	1,009,145	109%	\$ 383,814	\$ 3,517,885	\$ 3,664,303	96%

	Homes Weatherized				Gross CCF Savings				Program Expenditures			
	Current Month (Dec)	YTD	Planning Goal	% to Goal	Current Month (Dec)	YTD	Planning Goal	% to Goal	Current Month (Dec)	YTD	Planning Goal	% to Goal
TEEM I	4	204	160	128%	776	39,576	31,040	128%	\$ 23,696	\$ 1,117,622	\$ 1,120,926	100%
TEEM II	51	141	123	115%	8,568	23,688	20,664	115%	\$ 379,785	\$ 1,074,002	\$ 1,074,742	100%
Total	55	345	283	122%	9,344	63,264	51,704	122%	\$ 403,481	\$ 2,191,624	\$ 2,195,668	100%

December 2017 Scorecard - Vectren Ohio



	Measures Implemented				Gross CCF Savings				Program Expenditures			
	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal
Residential Programs												
Residential Prescriptive Program												
Furnace 95%	227	2,080	1,900	109%	27,399	251,056	229,330	109%				
Furnace 97%	53	477	1,000	48%	8,015	72,141	151,240	48%				
New Construction Furnace 97%	0	3	30	10%	0	337	3,369	10%				
Boiler 95%	4	31	30	103%	714	4,096	5,257	78%				
Programmable Thermostat	43	574	500	115%	1,424	19,011	16,560	115%				
Wi-Fi (Smart) Thermostat	1,371	5,876	1,200	490%	92,378	395,925	80,856	490%				
Wi-Fi (Basic) Thermostat	92	1,276	1,975	65%	5,298	73,485	113,740	65%				
Residential Prescriptive Subtotal	1,790	10,317	6,635	155%	135,229	816,051	600,352	136%	\$ 195,014	\$ 1,473,606	\$ 1,320,562	112%
Residential Home Insulation												
Air Sealing and Insulation Jobs	21	315	550	57%	5,355	95,264	155,573	61%				
Direct Install Measures (Showerheads, Tstats,	1	42	83	51%	64	2,810	4,950	57%				
Residential Home Insulation	21	315	550	57%	5,418	98,074	160,523	61%	\$ 89,455	\$ 809,897	\$ 1,040,438	78%
Schools	0	9,163	9,000	102%	0	100,976	99,180	102%	\$ 17,306	\$ 293,593	\$ 330,522	89%
Total Residential	1,811	19,795	16,185	122%	140,647	1,015,101	860,055	118%	\$ 301,775	\$ 2,577,095	\$ 2,691,522	96%
Commercial Programs												
Commercial Prescriptive Program												
Furnace 95%	3	98	70	140%	507	12,018	12,222	98%				
Furnace 97%	0	0	7	0%	0	0	1,334	0%				
Boiler - Commercial Prescriptive	1	18	33	55%	1,456	16,016	26,506	60%				
Boiler Tune-Up	0	1	20	5%	0	628	5,166	12%				
Wi-Fi (Smart) Thermostat	8	36	10	360%	392	1,765	490	360%				
Wi-Fi (Basic) Thermostat	0	20	50	40%	0	833	2,083	40%				
Steam Traps - Low Pressure	0	0	0	0%	0	0	0	0%				
Steam Traps - Dry Cleaners	0	25	0	0%	0	11,325	0	0%				
Commercial Prescriptive Subtotal	12	198	190	104%	2,355	42,585	47,800	89%	\$ (27,595)	\$ 139,309	\$ 188,887	74%
Commercial Custom												
< 7500 Therms	0	3	4	75%	0	5,086	16,540	31%				
>=7500 Therms	0	1	2	50%	0	9,413	8,270	114%				
Commercial Custom	0	4	6	67%	0	14,499	24,810	58%	\$ 2,452	\$ 43,256	\$ 84,336	51%
Total Commercial	12	202	196	103%	2,355	57,083	72,610	79%	\$ (25,143)	\$ 182,565	\$ 273,223	67%

December 2017 Scorecard - Vectren Ohio



	Measures Implemented				Gross CCF Savings				Program Expenditures			
	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal
Total Residential & Commercial	1,823	19,997	16,381	122%	143,003	1,072,185	932,666	115%	\$ 276,631	\$ 2,759,661	\$ 2,964,745	93%
Program Outreach and Education									\$ 13,691	\$ 66,362	\$ 325,000	20%
Online Tool Licensing Fees									\$ -	\$ 36,000	\$ 64,000	56%
Portfolio Total	1,823	19,997	16,381	122%	143,003	1,072,185	932,666	115%	\$ 290,323	\$ 2,862,023	\$ 3,353,745	85%

	Homes Weatherized				Gross CCF Savings				Program Expenditures			
	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal
VWP I	58	203	169	120%	15,080	52,780	43,940	120%	\$ 297,488	\$ 1,040,751	\$ 1,103,304	94%
VWP II	45	135	138	98%	14,355	43,065	44,022	98%	\$ 233,582	\$ 964,736	\$ 1,000,740	96%
Total	103	338	307	110%	29,435	95,845	87,962	109%	\$ 531,070	\$ 2,005,487	\$ 2,104,044	95%

December 2018 Scorecard - Vectren Ohio



	Measures Implemented				Gross CCF Savings				Program Expenditures			
	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal
Residential Programs												
Residential Prescriptive Program												
Furnace 95%	151	1,728	2,200	79%	18,226	208,570	265,540	79%				
Furnace 97%	43	533	500	107%	6,503	80,611	75,620	107%				
New Construction Furnace 97%	0	0	15	0%	0	0	1,685	0%				
Boiler 95%	4	34	30	113%	643	5,063	5,257	96%				
Wi-Fi (Smart) Thermostat	347	2,036	7,000	54%	23,381	137,186	471,660	54%				
Wi-Fi (Smart) Thermostat Online Store	177	1,763			11,926	118,791						
Wi-Fi (Basic) Thermostat	78	957	1,500	64%	4,492	55,114	86,385	64%				
Programmable Thermostat C/O 2017	0	52	0	-	0	1,722	0	-				
Furnace Tune Up & Tstat *	81	380	0	-	6,010	26,738	0	-				
Residential Prescriptive Subtotal	881	7,483	11,245	67%	71,181	633,793	906,146	70%	\$ 128,310	\$ 1,332,785	\$ 1,492,335	89%
Residential Behavioral *	62,501	62,501	0	-	36,463	72,925	0	-	\$ -	\$ 106,000	\$ -	-
Residential Home Insulation												
Wall Insulation	3	164	248	66%	694	37,914	57,218	66%				
Attic Insulation	5	577	523	110%	645	74,052	67,455	110%				
Air Sealing	5	636	545	117%	509	64,681	55,374	117%				
Direct Install Measures C/O 2017	0	4	0	-	0	236	0	-				
Residential Home Insulation	13	1,381	1,316	105%	1,847	176,883	180,047	98%	\$ 46,384	\$ 995,191	\$ 995,703	100%
DP&L EE Kits *	10,638	10,638	0	-	80,000	80,000	0	-	\$ 88,640	\$ 88,640	\$ -	-
Schools	887	9,000	9,000	100%	9,775	99,180	99,180	100%	\$ 34,522	\$ 284,175	\$ 302,950	94%
Total Residential	74,920	91,003	21,561	422%	199,265	1,062,781	1,185,373	90%	\$ 209,215	\$ 2,718,151	\$ 2,790,988	97%
Commercial Programs												
Commercial Prescriptive Program												
Furnace 95%	0	88	75	117%	0	10,622	13,095	81%				
Furnace 97%	0	0	5	0%	0	0	953	0%				
Boiler - Commercial Prescriptive	8	21	25	84%	9,835	26,464	20,080	132%				
Boiler Tune-Up	0	0	20	0%	0	0	3,300	0%				
Wi-Fi (Smart) Thermostat	2	11	30	120%	98	539	1,471	120%				
Wi-Fi (Smart) Thermostat Online Store	0	25			0	1,226						
Wi-Fi (Basic) Thermostat	0	9	50	18%	0	375	2,083	18%				
Steam Cooker New	0	0	3	0%	0	0	444	0%				
Convection Oven New	0	0	5	0%	0	0	1,315	0%				
Gas Fryer New	0	1	3	33%	0	1,010	1,515	67%				
Unit Heater - Condensing <300 MBH New	0	0	3	0%	0	0	798	0%				
Infrared Heater New	0	0	5	0%	0	0	1,580	0%				
Steam Traps *	0	215	0	-	52,237	160,963	0	-				
Commercial Prescriptive Subtotal	10	370	224	165%	62,170	201,198	46,633	431%	\$ 343	\$ 355,406	\$ 184,253	193%

December 2018 Scorecard - Vectren Ohio



	Measures Implemented				Gross CCF Savings				Program Expenditures			
	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal
Commercial Custom												
< 7500 Therms	0	9	4	225%	0	24,472	10,800	227%				
>=7500 Therms	0	4	2	200%	0	103,286	21,000	492%				
Commercial Custom	0	13	6	217%	0	127,758	31,800	402%	\$ 9,782	\$ 153,513	\$ 109,799	140%
Total Commercial	10	383	230	167%	62,170	328,956	78,433	419%	\$ 10,125	\$ 508,918	\$ 294,052	173%
Total Residential & Commercial	74,930	91,386	21,791	419%	261,435	1,391,738	1,263,806	110%	\$ 219,340	\$ 3,227,069	\$ 3,085,040	105%
Program Outreach and Education									\$ 127,917	\$ 181,520	\$ 325,000	56%
Online Tool Licensing Fees									\$ -	\$ 69,851	\$ 69,851	100%
Portfolio Total	74,930	91,386	21,791	419%	261,435	1,391,738	1,263,806	110%	\$ 347,257	\$ 3,478,440	\$ 3,479,891	100%

* Denotes Mid-Year Programs

	Homes Weatherized				Gross CCF Savings				Program Expenditures			
	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal	Current Month (December)	YTD	Planning Goal	% to Goal
VWP I	13	229	255	90%	2,522	44,426	49,470	90%	\$ 85,837	\$ 1,147,085	\$ 1,162,553	99%
VWP II	25	122	139	88%	5,200	25,376	28,912	88%	\$ 180,364	\$ 989,742	\$ 1,036,003	96%
Total	38	351	394	89%	7,722	69,802	78,382	89%	\$ 266,201	\$ 2,136,827	\$ 2,198,556	97%

Attachment D

Expenses (In Millions)		CCF Savings			
Year	DSM Only	Actual	Planned	% to Goal	Cumulative Savings
2009	\$ 1.49	254,475	365,399	70%	254,475
2010	\$ 3.11	877,833	902,528	97%	1,132,308
2011	\$ 3.63	1,149,211	1,079,713	106%	2,281,519
2012	\$ 3.55	1,115,429	922,203	121%	3,396,948
2013	\$ 3.13	922,723	900,074	103%	4,319,671
2014	\$ 3.13	964,918	917,768	105%	5,284,589
2015	\$ 3.12	954,255	847,296	113%	6,238,844
2016	\$ 3.52	1,101,144	1,009,144	109%	7,339,988
2017	\$ 2.86	1,072,185	932,666	115%	8,412,173
2018	\$ 3.48	1,391,738	1,263,806	110%	9,803,911
Total	\$ 31.01	9,803,911	9,140,597		48,464,424

*Excludes Low Income

**Includes Program Administrative and Outreach expenditures.

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Case No(s). 19-2084-GA-UNC

Summary: Application Application of Vectren Energy Delivery of Ohio, Inc. to Continue its Demand Side Management (DSM) Program for Residential and Commercial and Industrial Customers electronically filed by Mr. Christopher T Kennedy on behalf of Vectren Energy Delivery of Ohio, Inc.