



Verification of Vermont Gas Systems 2022
Efficiency Savings Claim and Assessment of
Performance Relative to 2021 – 2023
Performance Period Goals

Vermont Gas Systems EEU Savings Verification Report

Public Service Department

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Introduction

This report describes the result of a two-step review process undertaken by the Department of Public Service (“Department” or “PSD”) to assess the performance of the Energy Efficiency Utility (EEU) operated by Vermont Gas Systems during the 2022 program year (PY2022), the second year of the 2021 – 2023 performance period. First, with the assistance of its contractor, West Hill Energy and Computing, Inc. (WHEC), the Department verified the reported savings of the VGS EEU for PY 2022. Using those results, the Department then assessed VGS’ two-year performance with respect to the three-year quantifiable performance indicators (QPIs) and minimum performance requirements (MPRs) in the PUC order of October 22, 2020, as well as its qualitative obligations included in the PUC-issued *Process and Administration of an Energy Efficiency Utility Order of Appointment*.

The Department has determined that in PY2022, after an independent third-party impact evaluation and the application of the resulting realization rates, VGS was behind schedule meeting its three-year savings QPIs (QPIs #1, #2 and #3). VGS is also behind on meeting its administrative efficiency QPI (#8) but this administrative spending reduction metric is tracking slightly ahead of overall program spending. VGS is on track to meet all MPRs and other non-quantifiable obligations described in the Commission’s October 22, 2020 order and in VGS’ Order of Appointment. As evidenced by the high realization rates found during the third-party verification, VGS has shown continued competence in program implementation and savings estimation since being appointed an EEU. WHEC and the Department concur on a list of recommendations that broadly cover project analysis and documentation, which, if implemented, should improve VGS’ realization rates in its PY 2023 evaluation.

Scope of Evaluation

This report, which focuses on the second year of the 2021 – 2023 performance period, is the fulfillment of the Department’s obligation to perform annual savings verifications of the natural gas EEU pursuant to Sections II.5.E and II.5.H (c) of the “Process and Administration of an Energy Efficiency Utility Order of Appointment,” (revised November 26, 2019) and Section III.6.B of the “Order of Appointment for Vermont Gas Systems, Inc.,” issued by the Public Utility Commission on April 17, 2015.

To carry out these verification activities the Department retained the services of a consultant, West Hill Energy and Computing, Inc. (WHEC), to provide expert review and analysis of the VGS 2022 savings claim for the Commercial and Industrial (C&I) sector programs as well as the Residential New Construction program and Custom Residential Retrofit program. WHEC also assisted Department staff in verifying the savings claim for the Residential Equipment Replacement (RER) program as well as the other subprograms in the residential sector.

The objective of savings verification is to calculate annual and peak day savings realization rates (RRs) at the program and sector levels while leveraging information garnered during the verification process to inform future program design and budgeting. Evaluation activities include review of the full database of measure data and sampled project files to accomplish the following:

- Verify that savings assumptions have been applied appropriately and calculations performed correctly
- Calculate verified savings
- Establish realization rates on a program and sector level

To accomplish these goals, this report draws upon and supplements the findings of the attached WHEC report entitled: *Verification of Vermont Gas Systems' 2022 Annual Savings Claims*.

Summary of Results

The Department has reviewed the results of the savings verification with VGS staff and concurs with the findings of WHEC contained in the attached report entitled: *Verification of Vermont Gas Systems' 2022 Savings Claims*. The results of the PY 2022 savings verification at the sector level are summarized in Table 1, including the modified savings for the RER program:

Table 1. VGS Sector- and Portfolio-Level Certified Savings for PY* 2022

Sector	2022 VGS Reported Annual Mcf	2022 Certified Annual Mcf	2022 Annual Mcf Realization Rate	2022 VGS Reported Peak Day Mcf	2022 Certified Peak Day Mcf	2022 Peak Day Realization Rate
Residential Sector total	23,419	20,581	87.9%	237	208	87.7%
C/I sector total	36,377	35,781	98.4%	176	154	87.6%
Portfolio Total	59,795	56,362	94.3%	413	362	87.7%

* Program Year

The Department certifies the VGS verified savings for 2022 as shown in Table 1, above. The certified commercial and industrial (C&I) sector and residential sector verified savings at the program level are presented in Table 2, below.

Table 2. C&I and Residential PY 2022 Reported and Certified Savings

Program	2022 VGS Reported Annual Mcf	2022 Certified Annual Mcf	2022 Annual Mcf Realization Rate	2022 VGS Reported Peak Day Mcf	2022 Certified Peak Day Mcf	2022 Peak Day Realization Rate
Commercial Equipment Replacement (CER)	5,172	2,792	54.0%	53.3	27.4	51.4%
Commercial Retrofit (CSR)	27,368	30,344	110.9%	84.5	100.9	119.5%
Commercial New Construction (CNC)	3,837	2,645	68.9%	38.5	26.2	68.0%
C/I sector total	36,377	35,781	98.4%	176.2	154.4	87.6%
Program	2022 VGS Reported Annual Mcf	2022 Certified Annual Mcf	2022 Annual Mcf Realization Rate	2022 VGS Reported Peak Day Mcf	2022 Certified Peak Day Mcf	2022 Peak Day Realization Rate
Residential New Construction (RNC)	4,682	3,494	74.6%	54.1	38.3	70.8%
Residential Equipment Replacement (RER)	12,203	10,902	89.3%	93.9	90.6	96.5%
Custom Residential Retrofit (RIR)	6,534	6,185	94.7%	89.1	78.8	88.5%
Residential total	23,419	20,581	87.9%	237.0	207.8	87.7%
Portfolio total	59,795	56,362	94.3%	413.2	362.2	87.7%

The residential sector verified savings are further broken out into sub-programs in Table 3.

Table 3. VGS Residential Sector Verified Savings for PY 2022

Program	2022 VGS Reported Annual Mcf	2022 Verified Annual Mcf	2022 Annual Mcf Realization Rate	2022 VGS Reported Peak Day Mcf	2022 Verified Peak Day Mcf	2022 Peak Day Realization Rate
Residential New Construction	1,501	1,453	96.8%	21.3	20.6	96.8%
Custom Multifamily Residential New Construction	3,181	2,041	64.1%	32.8	17.7	53.9%
Residential New Construction (RNC) total	4,682	3,493	74.6%	54.1	38.3	70.8%
Residential Equipment Replacement	11,509	10,319	89.7%	86.8	84.9	97.8%
Custom Multifamily Residential Equipment Replacement	694	583	83.9%	7.1	5.7	80.7%
Residential Equipment Replacement (RER)	12,203	10,902	89.3%	93.9	90.6	96.5%
Residential Retrofit	3,118	3,118	100.0%	43.8	43.8	100.0%
Custom Multifamily Retrofit	741.0	623	84.1%	9.0	5.72	63.7%
Home Performance Residential Retrofit	520.5	521	100.0%	7.4	7.4	100.0%
Custom Low Income Retrofit	1,445.3	1,215	84.1%	19.2	12.20	63.7%
Low Income Residential Home Retrofit	316.2	316	100.0%	4.5	4.5	100.0%
Residential Direct Install	280.0	280	100.0%	3.7	3.7	100.0%
Residential Retrofit	94.4	94	100.0%	1.3	1.3	100.0%
Residential Retrofit Energy Snap Shot	18.4	18	100.0%	0.3	0.3	100.0%
Residential Home Retrofit (RIR) total	6,534	6,185	94.7%	89.1	78.8	88.5%
Residential Sector total	23,419	20,581	87.9%	237.0	207.8	87.7%

As is noted in the attached report, there were two primary factors that drove the variance of residential programs and sub programs' realization rates: 1.) the use of incorrect inputs to savings algorithms such as equipment efficiencies, annual hours of use and boiler capacity, and 2.) faulty baseline usage estimates.

For the Residential sector, the realization rate of 88% for annual incremental gas savings is largely driven by the Residential Equipment Replacement (RER) program which accounts for 53% of the sector savings. The evaluation team identified that for the RER program heating and hot water measures, VGS used the

“existing” AFUE to calculate the heat load input to the TRM algorithm but used the lower “base” AFUE for calculating the savings. The savings calculation for these measures was adjusted to use the base efficiency for both the heat load and energy savings calculations.

The RR for peak day gas savings in the residential sector was also 88% since peak day gas savings for prescriptive projects is calculated using the annual incremental savings multiplied by a peak day factor for each end use technology.

The Commercial and Industrial (C&I) sector annual incremental savings realization rate of 98% is a significant increase from the previous program year but would have been similar to last year were it not for a 111% RR in the Commercial Retrofit (“CSR”) program, which accounts for 85% of the commercial savings claim. Reasons for this high RR in the CSR program included under-estimating the square footage of an insulation retrofit project, billing analysis that indicated higher than expected savings and incorrectly applying a cooling adjustment factor. However, there was no common thread that would prompt any recommendation for program changes. The WHEC report notes that the key issues that influenced the C&I sector-level RR were incorrect inputs into savings algorithms, faulty estimates of baseline usage and minor errors due to not correctly converting between therms and ccf. There were also several instances where measure lifetimes were different from the Vermont TRM, resulting in lower lifetime savings for those measures.

The peak day Mcf savings RR for the C&I sector was verified at 88%, which is virtually the same as PY2021.

Quantifiable Performance Indicators

Section II.5.E of the *Process and Administration of an Energy Efficiency Utility Order of Appointment* requires the Department to annually certify to the Board that the natural gas EEU operated by VGS has satisfactorily achieved the performance metrics known as Quantifiable Performance Indicators (QPIs) that have been developed to assess whether the EEU is meeting established savings goals on the schedule and at the levels set by the Commission in its Order of October 21, 2020 in Case #19-3272-PET. Specifically, the Department is obligated to determine:

- (a) Whether VGS has made appropriate interim progress toward achieving QPIs;
- (b) Whether VGS is satisfactorily executing those of its responsibilities that are not directly measured by QPIs; and
- (c) Whether VGS' performance relative to its QPIs is consistent with the portion of the three-year budget that has been expended.

As detailed in the PUC order of October 22, 2020, VGS is responsible for meeting eight QPIs and six Minimum Performance Requirements (MPR). Based on a review of VGS' savings claims including the savings verification activities described in the attached report, the Department concludes that VGS is significantly behind schedule in attaining its annual incremental savings, lifetime savings and peak day savings goals but has shown satisfactory performance over two years in achieving the other PUC-ordered QPI targets for the three-year performance period. Tables 4, 5, 6, 7 and 8, below summarize VGS' performance in 2022 and over the first two years of the three-year performance period with respect to QPI #1a: Annual Incremental Gas Savings, QPI #1b: GHG Emissions Reduction QPI #2a: Total Resource Benefits, QPI #2b: Lifetime Gas Savings and QPI #3: Peak Day Gas Savings, respectively. It should be noted that individual programs in each sector may underperform with respect to the program-level target, while other programs may overperform. The PUC goal is set at the portfolio level. In the case of the Commercial New Construction (CNC) program, for instance, the verified two-year savings was 14 percent of the three-year goal due to inherent variability in participation for VGS' small commercial customer base and exacerbated by the COVID-19 pandemic.

Table 4. PY 2022 and Two-Year Performance vs. Goals – QPI #1a: Annual Incremental Mcf Savings

Program	QPI #1a Annual Incremental Mcf Savings			
	2021-23 Annual Mcf Three-Year Goal	PY 2021 Verified Annual Mcf	PY 2022 Verified Annual Mcf	2021-22 Verified Savings v. Three-Year Goal
Residential Home Retrofit (RIR)	15,490	5,098	6,185	73%
Residential New Construction (RNC)	41,751	6,017	3,493	23%
Residential Equipment Replacement (RER)	47,333	16,619	10,902	58%
Residential Sector Total	104,574	27,734	20,581	46%
Commercial Retrofit (CSR)	67,009	9,918	30,344	60%
Commercial New Construction (CNC)	40,206	3,150	2,645	14%
Commercial Equipment Replacement (CER)	27,862	6,740	2,792	34%
C&I Sector Total	135,077	19,808	35,781	41%
Portfolio Total	239,651	47,542	56,362	43%

Table 5: PY 2022 and Two-Year Performance vs. Goals - QPI #1b - GHG Emissions Reduction

Program	QPI #1b GHG Emissions Reduction (metric tons)			
	2021-23 Three-Year Goal	PY 2021 Verified GHG Reduction	PY 2022 Verified GHG Reduction	2021-22 Verified Savings v. Three-Year Goal
Residential Sector Total	5,766*	1,509	1,135	46%
C&I Sector Total	7,448*	1,078	1,973	41%
Portfolio Total	13,214	2,587	3,108	43%

*Sector-level goals and verified GHG reductions are estimated based on proportional savings goals and verified savings respectively

Table 6. PY 2022 and Two-Year Performance vs. Goals – QPI #2a: Total Resource Benefits (TRB)

Program	QPI #2a Total Resource Benefits			
	2021-23 Three-Year TRB Goal	PY2021 Verified TRB	PY2022 Verified TRB	2021-22 Verified vs. Three-Year Goal
Residential Home Retrofit (RIR)	\$2,696,580*	\$1,157,710	\$1,290,602	91%
Residential New Construction (RNC)	\$7,268,231*	\$1,499,964	\$ 574,576	29%
Residential Equipment Replacement (RER)	\$8,239,974*	\$4,013,345	\$2,146,844	75%
Residential Sector Total	\$18,204,784*	\$6,671,019	\$4,012,021	59%
Commercial Retrofit (CSR)	\$11,665,274*	\$1,779,428	\$7,416,046	79%
Commercial New Construction (CNC)	\$6,999,269*	\$735,717	\$ 401,933	16%
Commercial Equipment Replacement (CER)	\$4,850,361*	\$1,371,563	\$ 332,204	35%
C&I Sector Total	\$23,514,905*	\$3,886,709	\$8,150,182	51%
Portfolio Total	\$41,719,689	\$10,557,727	\$12,162,204	54%

*Sector level goals and verified GHG reductions are estimated based on proportional savings goals and verified savings respectively.

Table 7. PY 2022 and Two-Year Performance vs. Goals – QPI #2b: Lifetime Mcf Savings

Program	QPI #2b Lifetime Natural Gas Savings			
	2021-23 Three-Year Lifetime Mcf Goal	PY2021 Verified Lifetime Mcf	PY2022 Verified Lifetime Mcf	Two-Year Verified vs. Three-Year Goal
Residential Home Retrofit (RIR)	271,034	107,190	138,169	91%
Residential New Construction (RNC)	730,532	127,232	74,875	28%
Residential Equipment Replacement (RER)	828,203	318,056	210,207	64%
Residential Sector Total	1,829,769	552,478	423,251	53%
Commercial Retrofit (CSR)	1,172,481	170,538	395,633	48%
Commercial New Construction (CNC)	703,499	61,372	44,986	15%
Commercial Equipment Replacement (CER)	487,511	146,856	45,055	39%
C&I Sector Total	2,363,491	378,765	485,674	37%
Portfolio Total	4,193,260	931,243	908,924	44%

Table 8. PY 2022 and Two-Year Performance vs. Goals – QPI #3: Peak Day Mcf Savings

Program	QPI #3 Peak Day Mcf Savings			
	2021-23 Peak Day Mcf Three-Year Goal	PY 2021 Verified Peak Day Mcf	PY 2022 Verified Peak Day Mcf	Two-Year Verified vs. Three-Year Goal
Residential Home Retrofit (RIR)	134	58.8	78.8	103%
Residential New Construction (RNC)	390	71.5	38.3	28%
Residential Equipment Replacement (RER)	372	120.3	90.6	57%
Residential Sector Total	897	250.6	207.8	51%
Commercial Retrofit (CSR)	130	55.3	100.9	120%
Commercial New Construction (CNC)	224	35.1	26.2	27%
Commercial Equipment Replacement (CER)	106	42.7	27.4	66%
C&I Sector Total	459	133.1	154.4	63%
Portfolio Total	1,356	383.7	362.2	55%

QPI #4 is intended to ensure that VGS’ residential single-family energy efficiency initiatives are designed and implemented to acquire comprehensive savings rather than just the most cost-effective measures. QPI #4 is divided into two parts. The first part sets a performance goal for conversion of energy audits into energy saving improvements. The target set by the PUC for the 2021-2023 performance period was an overall 30% conversion rate. VGS achieved a 38% conversion rate in PY 2022, eight percentage points above the goal.

The second part of QPI #4 sets a target percentage of all cost-effective measures as well as those measures recommended by the audit that are installed by the customer within 12 months of the audit. The PUC set a goal of 70% of auditor recommended cost-effective measures installed within a year of the initial audit. VGS achieved an average of 96% install rate for recommended cost-effective measures in PY 2022, 26 percentage points better than the target set by the PUC.

VGS’ achievements regarding QPIs #1 through #4 are summarized in Table 9, below.

Table 9. PY 2021-2022 Performance vs. Three-Year Goals - QPIs #1 through #4

QPI #	Title	Performance Indicator	2021-2023 Three-Year Target	PY 2021 Achieved	PY 2022 Achieved	Achieved vs. Three-Year Target
1	Natural Gas Savings	a. Annual incremental net Mcf savings	239,651	47,542	56,362	43%
		b. Greenhouse Gas Emissions	13,214	2,587	3,108	43%

2	Lifetime Natural Gas Savings	a. Present worth of lifetime natural gas avoided costs	\$41,719,689	\$10,557,727	\$12,162,204	54%
		b. Lifetime Mcf savings	4,196,753	931,243	908,924	44%
3	Peak Day Natural Gas Savings	Peak day incremental Mcf savings	1,356	384	362	55%
4	Residential Single-Family Comprehensiveness	a. Percent of home energy audits converted to a measure installation within 12 months	30%	53%	38%	On Track
		b. Average percentage of auditor-recommended cost-effective measures that are installed by the customer within 12 months	70%	96%	96%	On Track

QPI Goals: Performance Compared with Expenditures

Table 10, below, compares performance on the three-year QPI #1 - #3 goals with the percentage of the budget expended by program and sector over the performance period. For the residential sector, 2022 expenditures were down slightly compared to 2021, with total two-year expenditures at 55% of the three-year budget. The two-year verified performance for QPIs #1, #2 and #3 were 46%, 53% and 51% of the three-year goals, respectively. This performance continues the slow pace of accomplishments from 2021, presumably due to the ongoing effects of the pandemic.

For the Commercial and Industrial sector, expenditures for 2022 were only 26% of the three-year budget, which is up significantly from 2021, but the two-year total expenditures are well behind where they should be at 41% of the 3-year budget. The performance vs. goals for QPIs #1, and #2 in the commercial sector were proportionate to the expenditures at 41% and 37% of the three-year goal, respectively. The two-year verified peak day savings in the C&I sector, however, was 63% of the three-year QPI #3 goal. This disproportionately high performance may be due in part to a larger proportion of projects were at firm rate commercial and industrial customers as opposed to interruptible rate customers than anticipated, which don't accrue any peak day savings by virtue of having their gas supply subject to interruption during peak events.

In 2022 for QPI #1, cost of savings was well above what was budgeted for the residential sector, where 56% of the three-year sector budget was spent to achieve 46% of the three-year QPI #1 savings goal. In the C&I sector, spending of 44% of the three-year budget yielded 41% of the three-year sector goal for QPI #1, slightly higher than the budgeted cost of savings. For QPI #2b (lifetime Mcf savings) the cost of savings was slightly above the three-year goals for the residential sector and significantly above the projected cost of savings for the C&I sector. For QPI #3, peak day Mcf savings, the residential sector slightly underperformed based on spending, while the C&I sector significantly overachieved in peak day savings compared to spending levels.

Table 10. PY 2022 Expenditures vs. Budget and Performance vs. Goals QPIs #1, #2 and #3

Program	Budget and Expenditures				QPI #1: Annual Incremental Mcf Savings	QPI #2b: Lifetime Natural Gas Savings	QPI #3: Peak Day Mcf Savings
	2021-23 Three-Year Budget	PY 2021 Expenditures	PY 2022 Expenditures	Two-Year Expenditures as % of Three-Year Budget	Two-Year Incremental Mcf Savings as % of Goal	Two-Year Lifetime NG Savings as % of Goal	Two-Year Peak Day Mcf Savings as % of Goal
Residential Home Retrofit	\$4,727,593	\$1,530,615	\$1,495,480	64%	73%	91%	103%
Residential New Construction	\$1,128,978	\$245,199	\$256,937	44%	23%	28%	28%
Residential Equipment Replacement	\$3,951,421	\$1,020,564	\$984,564	51%	58%	64%	57%
Residential Sector Total	\$9,807,992	\$2,796,378	\$2,736,981	56%	46%	53%	51%
Commercial Retrofit	\$1,693,466	\$315,352	\$841,375	68%	60%	48%	120%
Commercial New Construction	\$1,411,222	\$147,563	\$179,606	23%	14%	15%	27%
Commercial Equipment Replacement	\$1,199,539	\$186,856	\$202,444	32%	34%	39%	66%
C&I Sector Total	\$4,304,227	\$649,771	\$1,223,425	44%	41%	37%	63%
Portfolio Total	\$14,112,219	\$3,446,149	\$3,960,406	52%	43%	44%	55%

QPIs #5 Through #8

The PUC order of October 22, 2020 approving VGS’ DRP included eight QPIs. VGS’ performance regarding the first four QPIs was discussed above. VGS’ progress toward meeting QPIs #5 through #8 is summarized in Table 11, below.

Table 11. PY 2021 Verified Performance for QPIs #5 Through #8

QPI #	Title	Performance Indicator	2021-2023 Three-Year Requirement	2021 Verified Performance	2022 Verified Performance	Performance vs. Requirement
5	Residential Audits	Energy audits completed including comprehensive, home performance, customer, energy snapshots, low income, condominiums and mobile homes	600 Annually	706	642	Satisfactory
6	Long-term Market	Offer energy efficiency training for contractors	Two Per Year	Two	Two	Satisfactory

	Transformation					
7	Business Comprehensiveness of Savings	Diversity of measures implemented in commercial retrofit projects	A minimum of measures installed during the prior 12-months will be: 5% control-related, 20% heating systems, heat recovery or domestic hot water systems, 5% process-related and 15% shell or other-related	12% control-related, 21% heating systems, heat recovery or domestic hot water systems, 12% process-related and 55% shell or other-related	14% control-related, 6% heating systems, heat recovery or domestic hot water systems, 14% process-related and 66% shell or other-related	On Track
8	Administrative Efficiency	Administrative Cost reductions as a percent of total budget – proposal reflects 5% reduction goal	\$87,165 reduction	\$21,325	\$24,859	53% of goal

VGS had some difficulty meeting the exacting requirements of the “Business Comprehensiveness of Savings” QPI in the previous performance period. In a mature program with a relatively small population of commercial customers, variability in such measure distributions is expected. Accordingly, the minimum requirements for two measure categories have been reduced for the current 2021 -2023 performance period. Judging from the PY 2021 and 2022 results, VGS is on track to meet this modified QPI for the three-year period with the possible exception of the requirement that commercial retrofit projects include at least 20% heating, heat recovery or domestic hot water systems measures. About 14% of installed measures in commercial retrofit projects fell into that category through the first two years of the performance period.

VGS is also behind schedule in meeting the administrative efficiency requirements of MPR #8. This is concerning and warrants VGS’ attention for the remaining months of the performance period.

Addison County-Specific QPIs and MPR

Pursuant to the Commission order dated October 22, 2020 in Case # 19-3272-PET, VGS is required to track and report progress toward meeting QPIs #4a., #4b., #7 and MPR #14 for Addison County portion of VGS’ expanded territory. The Addison-specific results for those QPIs are presented in Table 12, below. The performance results regarding MPR #14 are included in Table 13 in the next section of this report.

Table 12. Addison County PY 2021 – 2022 Two-Year Verified Performance for QPIs #4a, #4b, and 7

QPI #	Title	Performance Indicator	2021-2023 Three-Year Target	2021 Achieved	2022 Achieved	Performance vs. Requirement
4	Residential Single-Family Comprehensiveness	a. Percent of home energy audits converted to a measure installation within 12 months	30%	50%	35%	On Track
		b. Average percentage of auditor-recommended cost-effective measures that are installed by the customer within 12 months	70%	100%	69%	Exceeds Target
7	Business Comprehensiveness of Savings	Diversity of measures implemented in commercial retrofit projects	A minimum of measures installed during the prior 12-months will be: 5% control-related, 20% heating systems, heat recovery or domestic hot water systems, 5% process-related and 15% shell or other-related	0% control-related, 14% heating systems, heat recovery or domestic hot water systems, 0% process-related and 86% shell or other-related	0% control-related, 0% heating systems, heat recovery or domestic hot water systems, 33% process-related and 67% shell or other-related	On track for process-related and shell measures, behind on heating systems and controls

Minimum Performance Requirements

According to the PUC order of October 22, 2020, VGS is also responsible for meeting certain Minimum Performance Requirements for the three-year performance period as described in Table 12. The Department has determined that VGS is on track toward satisfying each of these MPRs.

Table 13. PY 2021-22 Two-Year Performance vs. 2021-23 Three-Year Minimum Performance Requirements

MPR #	Title	Performance Indicator	2021-2023 Three-Year Requirement	2021 Verified Performance	2022 Verified Performance	Performance vs. Requirement
9	Minimum Natural Gas Benefits (Equity for All Natural Gas Ratepayers)	Total natural gas energy efficiency benefits divided by total utility costs	Equal or greater than 1.2 cost benefit ratio	2.98	3.07	Satisfactory
10	Equity for Residential Ratepayers	A minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	\$5,927,915	\$2,676,141	\$2,736,981	Satisfactory - 91% of 3-year requirement
11	Equity for Low-income Customers	A minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to Low-income customers	\$267,354	\$97,439	\$184,838	Achieved - 106% of 3-year minimum spend
12	Equity for Small Business Customers	Percent of commercial (non-residential) installed end uses that are classified as Rate G1 or G2 (use 600 Mcf/yr. or less)	30%	64%	49%	On track
13	Total Resource Benefits	Track and report non-natural gas TRB	Report annually	\$46,157	\$21,637	Satisfactory
14	Addison County Aggressive DSM	Meet minimum energy efficiency program participation rate for customers in Addison County	Achieve 30% energy efficiency participation in Addison County by Year 3	34.1%	34.8%	On track

Satisfaction of Non-Quantifiable Responsibilities of the EEU

As described in its Order of Appointment, the VGS EEU is required to meet certain other responsibilities beyond QPIs or MPRs. The Department’s qualitative assessment of the performance of the natural gas EEU, conducted through our review of reports and communications between staff and the EEU during the three-year period, confirms that VGS is also satisfactorily meeting those responsibilities. The PSD review has concluded that VGS continues to meet each of the following non-quantifiable responsibilities described in its Order of Appointment:

- Assist other Vermont Utilities in connection with the performance of Distributed Utility Planning and transmission planning.
- Provide technical support and training regarding the development and implementation of state energy codes and standards.
- Implement marketing to promote customer participation in and market awareness of EEU services and initiatives; increase consumer demand for energy-saving products and services; and affect consumer decision-making in consumer-driven energy efficiency choices.
- Provide: a toll-free number for its customers; a web page describing services available to customers; and effective customer response and referral procedures.
- Provide general information to the public to:
 - Increase consumer awareness and understanding of the benefits of reducing energy use;
 - Inform consumers of the best technologies available to them; and
 - Refer consumers to information and service resources other than the EEU.
- Assist the PUC and/or the Department in developing and implementing any Self-Administered or Managed Energy Efficiency Programs for eligible gas EEU customers.

Findings and Recommendations

The Department concurs with the findings and recommendations included in the attached report prepared by WHEC, *Verification of Vermont Gas Systems' 2022 Savings Claims*. Among the findings that are important to reiterate here are:

- Project Documentation: “The PY2021 and PY2020 savings verification reports identified issues with missing project-level documentation. While the West Hill Energy Team has noted some progress, there is room for further improvement. For 9 of the 19 C&I and MF sites with custom projects selected for desk review, the West Hill Energy Team had to request additional documentation to determine key inputs into the saving algorithms. Six (6) of the 19 sites were missing proof of installation for some measures.”
- Heating Load Estimation: “The West Hill Energy Team noticed substantial progress in correcting previous errors related to the estimation of heat loads, as discussed in the PY2021 savings verification report. A few issues still remain.”
- Standardize Analysis Methods: “VGS appears to be using a combination of the VGS TRM, EVT TRM, TRMs from other jurisdictions, custom tools, and TRM algorithms with custom inputs ... it is often unclear why specific methods or out-of-state TRMs were selected.”
- Update Weather Normalization Procedure: “Currently VGS uses typical meteorological year (TMY) 3 weather data to normalize all weather dependent calculations. Due to climate change, TMY3 30-year data (1976-2005) is not the best available information that represents future climate conditions for measures going forward.”
- Improve Savings Calculation Quality Control: Some calculation mistakes discovered during this evaluation appear to “result from simple errors that could be prevented with additional quality control.”
- Timing of Savings Calculations: “For some projects, commissioning or other fine-tuning of the equipment or systems seems to be conducted after the savings have been calculated.”

To address these issues as well others encountered during the evaluation, the WHEC report includes the following recommendations:

- VGS should continue its efforts to improve project-level documentation by providing more detailed description of the project files and analysis tools. While the evaluation team noted some progress, there is room for further improvement. Specific items to include in the project files include the following:
 - A project overview that describes the installed energy efficiency measures, the baseline and efficient operating conditions, applicable building energy code and project timeline. While a few projects included a narrative description, most did not.
 - Where Vermont energy code applies, the date of the permit and the applicable building energy code should be clearly stated. For several projects, additional documentation was required to determine the applicable code.
 - Sources of all inputs to the savings algorithm in the analysis spreadsheet; specifically any inputs that are different from the TRM defaults.
 - Proof of installation such as itemized invoices, inspection reports, clear photos of nameplate information and/or installation photos.
 - Analysis files should be in an editable and readable format such as a spreadsheet rather than password protected files or pdfs where values cannot be reviewed
- Whenever possible, heat loads calculated using engineering calculations should be checked against billing data to verify that the heat load is reasonable and the savings are realistic.
- VGS should continue to use site-specific inputs and/or custom approaches where appropriate and when the sources of the inputs can be properly documented. However, when alternative approaches are necessary, VGS should develop a clear and consistent strategy for selecting among alternatives such as out-of-state TRMs. When used, TRM measure characterizations should be fully adopted or rejected. TRM measure characterizations should not be partially adopted without a strong and defensible reason.
- VGS should adopt the most recent 6 to 10-year local weather data to normalize heating usage and savings estimates and use that weather normalization data in modeling of savings during each triennial demand resource planning process. For consistency, this change needs to be adopted by the EEU Technical Advisory Group and updated every three years.
- VGS' internal QC process should be improved to include a comprehensive review of project documentation and savings calculations. Topics to cover include the following:
 - Check that the analysis file savings match the program tracking database.
 - Reality checks on the magnitude of savings, using billing data if available.
 - Check that the peak day factor matches the end use and/or standardize the approach to assigning the peak day multiplier to the end use.

The Department concurs with the above recommendations and notes that some are similar to the recommendations in the 2021 savings verification report. The Department proposes to work with VGS and WHEC in the interim between evaluations to bring these recommendations to fruition.

Conclusion

VGS has continued to provide excellent program delivery, service quality and the accuracy of savings estimates as evidenced by the respectable and consistently solid realization rates across programs. Relative to the three-year goals for the 2021-2023 performance period, VGS was significantly behind schedule after the first year (PY 2021) largely due to the challenges posed by the pandemic and the related sub-optimal economic conditions including rising prices and workforce shortages. For PY 2022, performance continued to be below target rates for most programs with the exception of the residential retrofit program. The recommendations included in this report should help VGS to improve realization rates after the verification process for PY 2023, but it would take an exceptional effort and a significant improvement in market conditions to achieve the performance targets for QPIs #1, #2 and #3 by the end of the current performance period. The Department concludes that VGS is in a challenging position to meet its QPI targets for the 2021 -2023 performance period. The Department is also concerned that spending is outpacing these performance metrics in the residential sector. However, recognizing the demands of ramping up program performance during challenging economic conditions, VGS could consider petitioning the PUC for an adjustment of its QPIs for the remainder of the performance period.