



Verification of Vermont Gas Systems 2023
Efficiency Savings Claim and Assessment of
Performance During the 2021 – 2023
Performance Period

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 2023 program year (PY2023), the final 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 2023. Using those results, the Department then assessed VGS’ three-year performance with respect to the 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 PY2023, after an independent third-party impact evaluation and the application of the resulting realization rates, of its primary three-year savings QPIs (QPIs #1, #2 and #3), VGS fell short on meeting QPI #1 and #3, but achieved the target for QPI #2, Lifetime Natural Gas Savings. VGS also fell just short of meeting its administrative efficiency QPI (#8), achieving 95% of the target spending reduction and missed one of the four categories in the target measure mix for QPI #7, Business Comprehensiveness of Savings. VGS met 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 consistently 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. That said, VGS fell short on two of the three primary QPIs, and achieved 100% of the lifetime natural gas savings QPI #2 by nearly doubling the projected savings in the commercial retrofit program on account of increased project counts of all sizes and one large industrial project. The Department understands the challenges of the post-pandemic economic conditions but is nonetheless concerned about VGS falling short of these performance targets.

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 2024 evaluation.

Scope of Evaluation

This report, which covers the final 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 2023 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' 2023 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' 2023 Savings Claims*. The results of the PY 2023 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* 2023

Sector	2023 VGS Reported Annual Mcf	2023 Certified Annual Mcf	2023 Annual Mcf Realization Rate	2023 VGS Reported Peak Day Mcf	2023 Certified Peak Day Mcf	2023 Peak Day Realization Rate
Residential Sector total	16,759	16,560	98.8%	181	179	99%
C/I sector total	133,853	109,474	81.8%	179	98	55%
Portfolio Total	150,612	126,033	83.7%	360	278	77%

* Program Year

The Department certifies the VGS verified savings for 2023 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 2023 Reported and Certified Savings

Program	2023 VGS Reported Annual Mcf	2023 Certified Annual Mcf	2023 Annual Mcf Realization Rate	2023 VGS Reported Peak Day Mcf	2023 Certified Peak Day Mcf	2023 Peak Day Realization Rate
Commercial Equipment Replacement (CER)	11,314	11,145	98.5%	67.0	56.9	84.8%
Commercial Retrofit (CSR)	120,908	96,798	80.1%	95.5	25.7	26.9%
Commercial New Construction (CNC)	1,631	1,531	93.9%	16.8	15.7	93.5%
C/I sector total	133,853	109,474	81.8%	179.4	98.3	54.8%
Program	2023 VGS Reported Annual Mcf	2023 Certified Annual Mcf	2023 Annual Mcf Realization Rate	2023 VGS Reported Peak Day Mcf	2023 Certified Peak Day Mcf	2023 Peak Day Realization Rate

Residential New Construction (RNC)	2,644	2,542	96.1%	26.7	26.3	98.4%
Residential Equipment Replacement (RER)	9,764	9,671	99.0%	98.4	97.8	99.3%
Custom Residential Retrofit (RIR)	4,351	4,347	99.9%	55.5	55.5	99.9%
Residential total	16,759	16,560	98.8%	180.7	179.5	99.4%
Portfolio total	150,612	126,033	83.7%	360.1	277.8	77.2%

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

Table 3. VGS Residential Sector Verified Savings for PY 2023

Program	2023 VGS Reported Annual Mcf	2023 Verified Annual Mcf	2023 Annual Mcf Realization Rate	2023 VGS Reported Peak Day Mcf	2023 Verified Peak Day Mcf	2023 Peak Day Realization Rate
Residential New Construction	484	512	106%	6.0	6.4	105.9%
Custom Multifamily Residential New Construction	2,160	2,029	94.0%	20.7	19.9	96.2%
Residential New Construction (RNC) total	2,644	2,542	96.1%	26.7	26.3	98.4%
Residential Equipment Replacement	9,180	9,432	102.7%	92.0	95.4	103.7%
Custom Multifamily Residential Equipment Replacement	584	239	41.0%	6.4	2.4	36.6%
Residential Equipment Replacement (RER)	9,764	9,671	99.0%	98.4	97.8	99.3%
Residential Retrofit	2,390	2,390	100.0%	33.6	33.6	100.0%
Custom Multifamily Retrofit	0.0	0	99.5%	0.0	0.0	99.7%
Home Performance Residential Retrofit	509.5	509	100.0%	7.1	7.1	100.0%
Custom Low Income Retrofit	928.9	924	99.5%	11.2	11.2	99.7%
Low Income Residential Home Retrofit	27.5	28	100.0%	0.4	0.4	100.0%
Residential Direct Install	346.6	347	100.0%	1.1	1.1	100.0%
Residential Retrofit	140.5	141	100.0%	2.0	2.0	100.0%
Residential Retrofit Energy Snap Shot	8.5	9	100.0%	0.1	0.1	100.0%
Residential Home Retrofit (RIR) total	4,351	4,347	99.9%	55.51	55.47	99.9%
Residential Sector total	16,759	16,560	98.8%	180.7	179.5	99.3%

As is noted in the attached report, there were several 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, 2.) faulty baseline usage estimates, 3.) the use of incorrect peak day factors and measure lifetimes, and 4.) failure to check baseline and savings estimates against actual billing data.

For the Residential sector, the overall realization rate of 99% for annual incremental gas savings demonstrates consistent excellence in program implementation and savings estimation for all three residential programs. The Residential Equipment Replacement (RER) program which accounts for 58% of the sector savings and the Residential Retrofit program which accounts for another 26% of sector savings had realization rates of 99% and 100% respectively. The Department notes that VGS rectified an unintentional and previously undetected error in the interpretation of a TRM savings algorithm for space heating measures as recommended following the PY2022 evaluation. This resulted in a significant improvement in the realization rate for the RER program in particular. Although this correction also resulted in reduced verified savings compared to what was modeled in the potential study that informed VGS' Triennial Plan for 2021 - 2023, VGS opted not to pursue a QPI adjustment based on this change.

The RR for peak day gas savings in the residential sector was also 99% 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 82% is a significant drop from the previous program year but this was largely due to a 71% RR for the largest project in the sector which alone accounts for over half of the verified savings. This in turn brought the realization rate down to 80% for Commercial Retrofit ("CSR") program, which accounts for 88% of the commercial savings claim. The WHEC report notes that the key issues that influenced the C&I sector-level RR were incorrect inputs into savings algorithms, use of incorrect measure lifetime for one measure, use of incorrect peak day factors and overestimation of baseline usage. For the largest C&I project sampled, VGS relied entirely on engineering calculations for its savings estimate. A billing analysis indicated significantly lower than expected savings. Several other projects had lower heating loads than the TRM assumptions when compared to billing data. One measure was included in VGS's program reported savings twice due to an error in project tracking.

The peak day Mcf savings RR for the C&I sector was verified at 55%, which is significantly below PY2022. This reduction is due in large part to the low RR for the CSR program, which in turn was due largely to a low RR for the one sampled project with peak day savings in that program. The low RR for the C&I sector was also a result of the misapplication of peak day savings factors for large projects.

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 after anemic performance in the first two years of the performance period, VGS came close to attaining its annual incremental savings goal and achieved its lifetime savings target but fell well short of meeting its peak day savings goals. VGS 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 2023 and over 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 three-year savings was 18 percent of the three-year goal due in part to the increasing prevalence of heat pump or geothermal space heat and hot water systems in new construction projects which are ineligible for VGS EEU programs as well as a rising energy code baseline. Performance in all three programs in the sector is also subject to the inherent variability in participation for VGS' small commercial customer base and the ongoing effects of the COVID-19 pandemic.

Table 4. PY 2023 and Three-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 2023 Verified Annual Mcf	2021-2023 Three-Year Verified Savings	2021-23 Verified Savings v. Three-Year Goal
Residential Home Retrofit (RIR)	15,490	4,347	15,629	101%
Residential New Construction (RNC)	41,751	2,542	12,052	29%
Residential Equipment Replacement (RER)	47,333	9,671	37,192	79%
Residential Sector Total	104,574	16,560	64,874	62%
Commercial Retrofit (CSR)	67,009	96,798	137,060	205%
Commercial New Construction (CNC)	40,206	1,531	7,326	18%
Commercial Equipment Replacement (CER)	27,862	11,145	20,677	74%
C&I Sector Total	135,077	109,474	165,063	122%
Portfolio Total	239,651	126,033	229,937	96%

Table 5. PY 2023 and Three-Year Performance vs. Goals - QPI #1b - GHG Emissions Reduction

Program	QPI #1b GHG Emissions Reduction (metric tons)			
	2021-23 Three-Year Goal	PY 2023 Verified GHG Reduction	2021-2023 Three-Year Verified Savings	2021-23 Verified Savings v. Three-Year Goal
Residential Sector Total	5,766*	913	3,557	62%
C&I Sector Total	7,448*	6,036	9,087	122%
Portfolio Total	13,214	6,949	12,644	96%

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

Table 6. PY 2023 and Three-Year Performance vs. Goals – QPI #2a: Total Resource Benefits (TRB)

Program	QPI #2a Total Resource Benefits			
	2021-23 Three-Year TRB Goal	PY2023 Verified TRB	2021-23 Three-Year Verified TRB	2021-23 Verified TRB vs. Three-Year Goal
Residential Home Retrofit (RIR)	\$2,696,580*	\$1,102,661	\$3,550,972	132%
Residential New Construction (RNC)	\$7,268,231*	\$528,728	\$2,603,267	36%
Residential Equipment Replacement (RER)	\$8,239,974*	\$2,094,304	\$8,254,493	100%
Residential Sector Total	\$18,204,784*	\$3,725,692	\$14,408,732	79%
Commercial Retrofit (CSR)	\$11,665,274*	\$21,770,701	\$30,966,175	265%
Commercial New Construction (CNC)	\$6,999,269*	\$263,115	\$1,400,765	20%
Commercial Equipment Replacement (CER)	\$4,850,361*	\$2,413,379	\$4,117,145	85%
C&I Sector Total	\$23,514,905*	\$24,447,195	\$36,484,086	155%
Portfolio Total	\$41,719,689	\$28,172,887	\$50,892,818	122%

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

Table 7. PY 2023 and Three-Year Performance vs. Goals – QPI #2b: Lifetime Mcf Savings

Program	QPI #2b Lifetime Natural Gas Savings			
	2021-23 Three-Year Lifetime Mcf Goal	PY2023 Verified Lifetime Mcf	2021-23 Three-Year Verified Lifetime Mcf	2021-23 Three-Year Verified vs. Three-Year Goal
Residential Home Retrofit (RIR)	271,034	93,998	339,357	125%
Residential New Construction (RNC)	730,532	47,098	249,205	34%
Residential Equipment Replacement (RER)	828,203	191,817	720,080	87%
Residential Sector Total	1,829,769	332,913	1,308,642	72%
Commercial Retrofit (CSR)	1,172,481	1,768,232	2,334,403	199%
Commercial New Construction (CNC)	703,499	23,610	129,968	18%
Commercial Equipment Replacement (CER)	487,511	228,939	420,849	86%
C&I Sector Total	2,363,491	2,020,781	2,885,220	122%
Portfolio Total	4,193,260	2,353,694	4,193,862	100%

Table 8. PY 2023 and Three-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 2023 Verified Peak Day Mcf	2021-23 Three-Year Verified Peak Day Mcf	2021-23 Verified vs. Three-Year Goal
Residential Home Retrofit (RIR)	134	55.5	193.2	144%
Residential New Construction (RNC)	390	26.3	136.1	35%
Residential Equipment Replacement (RER)	372	97.8	308.7	83%
Residential Sector Total	897	179.5	637.9	71%
Commercial Retrofit (CSR)	130	25.7	181.9	140%
Commercial New Construction (CNC)	224	15.7	77.0	34%
Commercial Equipment Replacement (CER)	106	56.9	126.9	120%
C&I Sector Total	459	98.3	385.9	84%
Portfolio Total	1,356	277.8	1023.8	76%

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 31% conversion rate in PY 2023 and a 40% conversion rate for the three-year performance period, a full 10 percentage points above the goal.

The second part of QPI #4 sets a target percentage of all cost-effective measures and 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 97% install rate for recommended cost-effective measures in PY 2023 and 96% for the three-year performance period, 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 2021-2023 Performance vs. Three-Year Goals - QPIs #1 through #4

QPI #	Title	Performance Indicator	2021-2023 Three-Year Target	PY 2023 Achieved	2021-2023 Three-Year Verified Performance	Performance vs. Three-Year Target
1	Natural Gas Savings	a. Annual incremental net Mcf savings	239,651	126,033	229,937	96%
		b. Greenhouse Gas Emissions	13,214	6,949	12,644	96%
2	Lifetime Natural Gas Savings	a. Present worth of lifetime natural gas avoided costs	\$41,719,689	\$28,172,887	\$50,892,818	122%
		b. Lifetime Mcf savings	4,193,260	2,353,694	4,193,862	100%
3	Peak Day Natural Gas Savings	Peak day incremental Mcf savings	1,356	278	1,024	76%
4	Residential Single-Family Comprehensiveness	a. Percent of home energy audits converted to a measure installation within 12 months	30%	31%	40%	Achieved
		b. Average percentage of auditor-recommended cost-effective measures that are installed by the customer within 12 months	70%	97%	96%	Achieved

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, 2023 expenditures were up significantly compared to 2021 and 2022, with total three-year expenditures at 91% of the three-year budget. The 2023 achievements for the three primary energy savings QPIs were up proportionally. However, the three-year verified performance for QPIs #1, #2b and #3 were 62%, 72% and 71% of the goals, respectively. While VGS’ performance in the residential sector improved remarkably compared to the first two years of the performance period, the slow pace of accomplishments from 2021 and 2022 - largely due to the ongoing effects of the pandemic and increasing electrification of thermal loads in new construction – resulted in performance well below target for the three-year performance period in the residential sector.

For the Commercial and Industrial sector, expenditures for 2023 were over 61% of the three-year budget, which is up significantly from 2021 and 2022. The three-year total expenditures are 105% of the 3-year budget. The performance vs. goals for QPIs #1, and #2a in the commercial sector for PY 2023 alone were

significantly higher than the annual target at 81% and 102% of the *three-year* goal, respectively, due in large part to two large projects that closed in PY 2023. For the three-year performance period, VGS' performance with respect to QPIs #1, #2a and #2b were 122%, 155% and 122% of the goals, respectively. However, the three-year verified peak day savings in the C&I sector, QPI #3, was 84% of the three-year QPI #3 goal. This disproportionately low performance for peak day Mcf savings is due in part to the fact that the largest project that closed in 2023 was for an interruptible rate industrial customer which don't accrue any peak day savings by virtue of having their gas supply subject to interruption during peak events.

In 2023 for QPI #1, cost of savings was well above what was budgeted for the residential sector, where 34% of the three-year sector budget was spent to achieve 16% of the three-year QPI #1 savings goal. In the C&I sector, however, spending of 61% of the three-year budget yielded 81% of the three-year sector goal for QPI #1, a cost of savings significantly lower than budgeted.

For QPI #2b (lifetime Mcf savings) the cost of savings in 2023 was nearly double the three-year budget for the residential sector but significantly below the projected cost of savings for the C&I sector. For QPI #3, peak day Mcf savings, both the residential and commercial sectors underperformed based on spending, with 34% of the residential sector spent to achieve only 20% of the 2023 QPI #3 goal and 61% of the C&I sector budget spent to achieve only 21% of the QPI #3 peak day Mcf savings goal. The underperformance in the C&I sector can largely be explained by the fact that much of the savings achieved in 2023 were at interruptible industrial sites which don't contribute to peak day natural gas load.

Table 10. PY 2023 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 2023 Expenditures	2021-2023 Three-Year Expenditures	2021-2023 Expenditures as % of Three-Year Budget	Three-Year Incremental Mcf Savings as % of Goal	Three-Year Lifetime NG Savings as % of Goal	Three-Year Peak Day Mcf Savings as % of Goal
Residential Home Retrofit	\$4,727,593	\$1,390,470	\$4,416,565	93%	101%	125%	144%
Residential New Construction	\$1,128,978	\$201,509	\$703,645	62%	29%	34%	35%
Residential Equipment Replacement	\$3,951,421	\$1,753,681	\$3,758,809	95%	79%	87%	83%
Residential Sector Total	\$9,807,992	\$3,345,660	\$8,879,019	91%	62%	72%	71%
Commercial Retrofit	\$1,693,466	\$2,072,001	\$3,228,727	191%	205%	199%	140%
Commercial New Construction	\$1,411,222	\$174,283	\$501,453	36%	18%	18%	34%
Commercial Equipment Replacement	\$1,199,539	\$393,166	\$782,467	65%	74%	86%	120%
C&I Sector Total	\$4,304,227	\$2,639,450	\$4,512,647	105%	122%	122%	84%
Portfolio Total	\$14,112,219	\$5,985,110	\$13,391,665	95%	96%	100%	76%

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	2023 Verified Performance	2021-2023 Three-Year Verified Performance	Performance vs. Three-Year Requirement
5	Residential Audits	Energy audits completed including comprehensive, home performance, customer, energy snapshots, low income, condominiums and mobile homes	600 Annually	680	2029	Achieved Average of 676 per year
6	Long-term Market Transformation	Offer energy efficiency training for contractors	Two Per Year	Two Completed	Six completed	Achieved
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	4% control-related, 19% heating systems, heat recovery or domestic hot water systems, 21% process-related and 57% shell or other-related	9% control-related, 16% heating systems, heat recovery or domestic hot water systems, 16% process-related and 58% shell or other-related	Satisfactory Achieved three of four categories of the measure mix distribution
8	Administrative Efficiency	Administrative Cost reductions as a percent of total budget – proposal reflects 5% reduction goal	\$87,165 reduction	\$36,354	\$82,535	Achieved 95% of target cost reduction while spending 95% of the RA budget

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. VGS met three of the four categories of the target measure mix in this QPI for the three-year period, the exception being the

requirement that commercial retrofit projects include at least 20% heating, heat recovery or domestic hot water systems measures. About 16% of installed measures in commercial retrofit projects fell into that category through the three-year performance period.

VGS fell 5% shy of meeting the administrative efficiency spending reduction requirements of MPR #8. The MPR is set as a dollar amount (\$87,165) rather than as a percentage of administrative spending, so while VGS equaled the intended 5% reduction in administrative costs compared to actual RA spending, since RA spending was only 95% of budget, this translated to an administrative spending reduction of only 95% of the target dollar amount. This practically meets the intent of the QPI but falls 5% shy of the specific QPI target expressed as a dollar amount.

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 – 2023 Three-Year Verified Performance for QPIs #4a, #4b, and 7

QPI #	Title	Performance Indicator	2021-2023 Three-Year Target	2023 Achieved	2021-2023 Three-Year Verified Performance	Performance vs. Requirement
4	Residential Single-Family Comprehensiveness	a. Percent of home energy audits converted to a measure installation within 12 months	30%	63%	45%	Achieved
		b. Average percentage of auditor-recommended cost-effective measures that are installed by the customer within 12 months	70%	81%	74%	Achieved

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	13% control- related, 38% heating systems, heat recovery or domestic hot water systems, 0% process- related and 50% shell or other-related	6% control- related, 22% heating systems, heat recovery or domestic hot water systems, 6% process- related and 67% shell or other-related	Achieved
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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 each of these MPRs.

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

MPR #	Title	Performance Indicator	2021-2023 Three-Year Requirement	2023 Verified Performance	2021-2023 Three-Year 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	4.75	3.03	Significantly better than requirement
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	\$3,345,660	\$8,879,019	150% 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	\$102,991	\$385,268	144% of 3-year requirement

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%	49%	54%	Significantly better than requirement
13	Total Resource Benefits	Track and report non-natural gas TRB	Report annually	\$17,147	\$67,794	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	36.8%	36.8%	Achieved

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' 2023 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 and VGS has made substantial progress in addressing these issues. The proof of installation documentation has significantly improved, with all but one measure having some sort of documentation. In general, inputs and methods were better documented than found in previous years. However, there is room for further improvement. For 9 of the 16 C&I and multifamily sites selected for desk review, the PSD Evaluation Team had to request additional documentation to determine or confirm key inputs into the savings algorithms.”
- Heating Load Estimation. “The PSD Evaluation Team noted substantial progress in correcting previous errors related to the estimation of heat loads, as discussed in the PY2021 and PY2022 savings verification reports. VGS appears to be using billing data more frequently to estimate heating loads, which is consistent with recommendations from the PSD Evaluation Team and the PUC auditor and with the related measure characterizations in the PY2024 VGS TRM. A couple of minor issues still remain.
 - “In PY2022, VGS adjusted the pre-install billing consumption for all single-family RER equipment replacements to reflect the average actual efficiency of the existing equipment; however, the efficiency was higher than the baseline efficiency. In PY2023, VGS corrected this error for all measures with the exception of on-demand water heaters, which still needs to be corrected.
 - “The PSD Evaluation Team noted a small discrepancy in the VGS billing data in PY2022, in which the HDD was slightly overstated (by 3% on average) due to a mismatch in the days in each billing cycle. This results in a minor underestimation of savings for any projects (all RER, some custom projects) that rely on billing data. As this error is embedded in the VGS billing system, it is difficult to correct. This small discrepancy was not corrected as of PY2023 and is noted here for future evaluators.
 - In PY2023, VGS argued that billing analysis should only be used in the C&I sector to estimate savings for custom measures and not for prescriptive ER measures. This argument runs counter to the PSD evaluation approach, the PUC auditor’s recommendation, and also is inconsistent with VGS’s use of billing analysis for estimating the savings for residential ER measures.
- Weather Normalization Data and Procedure. “Currently VGS uses 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.”
- 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. For example, the lifetime savings for one site were entered as the annual Mcf savings, one measure was incorrectly double counted, and the peak savings for several measures were calculated using the wrong peak day factor.”

- Timing of Project Completion: “For some projects, commissioning or other fine-tuning of the equipment or systems seems to be conducted after the savings have been calculated and the project is marked as complete. ... [This] may not consider ongoing efforts on site to improve the operation of the equipment, especially if it is still ongoing during the verification process.”

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

- Improve Project Documentation: 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.
 - Sources for all inputs to the savings algorithm in the analysis spreadsheet, especially any inputs that are different from the TRM defaults.
 - Proof of installation such as itemized invoices, inspection reports, clear photos of nameplate information and installation photos.
- The date of the permit and the applicable building energy code should be clearly stated where applicable. Improve Heating Load Estimation. Whenever possible, heat loads calculated using engineering calculations should be checked against the VGS TRM and billing data to verify that the heat load is reasonable and the savings are realistic.
- Update Weather Normalization Data and Procedure. With concurrence from the EEU Technical Advisory Group (TAG), VGS and the other EEUs should adopt the most recent 6- to 10-year local weather data from the nearest National Oceanic Atmospheric Administration (NOAA) weather station to estimate the future heating loads more accurately and in modeling of savings during each triennial demand resource planning process. This weather data needs to be updated every three years in advance of the EEU Demand Resource Planning (DRP) process.
- Improve Internal Savings Calculation Quality Control. 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.
 - Ensure that installed measures are assigned to the correct program and verify that the same measures are not counted in multiple programs.
- Standardize the Timing of Project Completion. VGS should calculate savings after the equipment or systems are completely operational and sufficient time has elapsed to review post-install billing data, especially for large or complex projects. At that point, the project can be counted as completed.

The Department concurs with the above recommendations and notes that some are similar to the recommendations in the 2022 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, with the exception of a couple of large custom projects in 2023, accurate savings claims as evidenced by the respectable realization rates across programs. Relative to the three-year savings goals for the 2021-2023 performance period, VGS was significantly behind schedule after the first two years largely due to the challenges posed by the pandemic and the related economic conditions including rising prices and workforce shortages. For PY 2023, performance improved across the portfolio but the performance metrics in the residential sector continued to be below target rates. The commercial sector more than made up for the lower than expected results in the residential sector, largely due to an increasing number of large custom projects in the CSR program after reduced participation in PY 2021 & 2022 due to lingering post-pandemic challenges. However, the Department is concerned that VGS program spending was shifted toward the Commercial and Industrial sector compared to the PUC-approved budget in order to meet its QPI targets. The Department will be scrutinizing the sector equity of VGS' EEU programs during the current performance period to ensure that there is a more balanced allocation of resources and benefits.

The recommendations included in this report should help VGS to further improve realization rates and streamline the evaluation process. The Department acknowledges the extra effort it took along with a significant improvement in market conditions for VGS to reach (or nearly so) the performance targets for QPIs #1 and #2 by the end of PY 2023. The Department concludes that VGS worked diligently to meet its QPI targets for the 2021 -2023 performance period but was stymied by economic conditions beyond its control. The Department is also concerned that the allocation of resources is out of balance in favor of the C&I sector and that spending is outpacing performance metrics in the residential sector.