Energy Management Technology Evaluation – Commercial and Industrial: Direct and Indirect Benefits

Final Report

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Executive summary

This report presents a comprehensive program evaluation of the NYSERDA Real Time Energy Management (RTEM) program, which provides cost-sharing incentives[1] to support the installation of Energy Management (EM) technology, including data collection and control systems and vendor reviews of the captured data. This report builds on prior program evaluation results to characterize direct and indirect impacts to the commercial, small to medium business, and industrial sectors across all years of program execution (Q1 2017 to Q2 2024). Prior evaluations also characterized the market effects and, separately, reviewed the direct benefits of the program. This study provides comprehensive coverage of direct impacts while also assessing the extent to which the program influenced market activities outside of the direct incentive and vendor consulting support offer with the intention of capturing indirect benefits.

Approach

The study collected information to verify the total achieved savings and market influence of the program through a variety of energy data and market actor interviews/round tables, as outlined in Table ES-1, in accordance with NYSERDA's Indirect Benefits Framework.[2]

Table ES-1. Indirect benefits framework and data collection methods by market actor

Market actor	Direct benefits	Indirect benefits	Data collection methods
Participating buildings (i.e., buildings that received program funding for the installation of eligible EM technology and are owned by participating organizations)	Direct involvement participant adoption: savings from NYSERDA-funded projects identified by program vendors *through vendor service reports and interviews with building owners/managers and vendors*	Direct influence participant adoption: additional savings and/or non-energy benefits enabled by RTEM *but not reported in vendor service reports*	• Vendor service report Artificial Intelligence (AI) data extraction for engineering reviews • Building consumption data • Interviews with participating vendors and participating building owners/managers
Nonparticipating buildings (i.e., buildings that did not	N/A	Direct influence participant adoption: adoption of eligible EM	• Vendor round tables • Interviews with participating vendors

[1] Incentives are based on the project cost (30% for up to a five-year vendor contract).

[2] https://nysemail.sharepoint.com/sites/nyserda-ext/ExternalCollaboration/Contractors/RFQL4162/Resources/Guidance%20Documents/PM-Indirect%20Benefit%20Framework.pdf

Market actor	Direct benefits	Indirect benefits	Data collection methods
receive program funding for the installation of eligible EM technology but are owned by organizations that did receive incentives at other buildings)		technology (and resulting energy savings and/or non-energy benefits) at sites without program funding *but influenced by program participation*	and participating building owners/managers
Nonparticipating buildings (i.e., buildings that did not receive program funding for the installation of eligible EM technology and are not owned by organizations that received incentives at other buildings)	N/A	Nonparticipant adoption: adoption of eligible EM technology (and resulting energy savings and/or non-energy benefits) at sites without program funding *but influenced by NYSERDA's market activities* (e.g., interactions with vendors and/or NYSERDA program staff and/or other utility program staff or training/marketing provided by the NYSERDA RTEM program)	• Vendor round tables • Data gathering from publicly available websites to identify projects from nonparticipating vendors and EM technologies • Interviews with participating vendors, nonparticipating vendors, NYSERDA program staff, and other utility program staff

AI data extraction

NYSERDA-approved Artificial Intelligence (AI) tools[3] were used to extract data from vendor reports very efficiently. Although it took time to develop the methodology and capabilities, the benefits far outweighed the cost in terms of data made available in this evaluation study and the opportunity for NYSERDA to further leverage the AI tool in future studies.

For analysis of vendor reports, 401 single-project sites had vendor reports and the AI tool extracted usable data from 345 sites (86%).[4] Web data gathering also employed AI and gathered data from nearly 8,400 pages covering 211 non-participating vendors. Most notably, the current evaluation and use of AI enabled sampling of all reports, efficient resolution of missing or

[3] AI tool developed for NYSERDA received AI Governance approval in accordance with New York State policy "Acceptable Use of Artificial Intelligence Technologies" 3/11/25; https://its.ny.gov/system/files/documents/2025/05/nys-p24-001-acceptable-use-of-artificial-intelligence-technologies.pdf#:~:text=All%20use%20of%20AI%20must,Standards)%2C%20as%20well%20as%20the

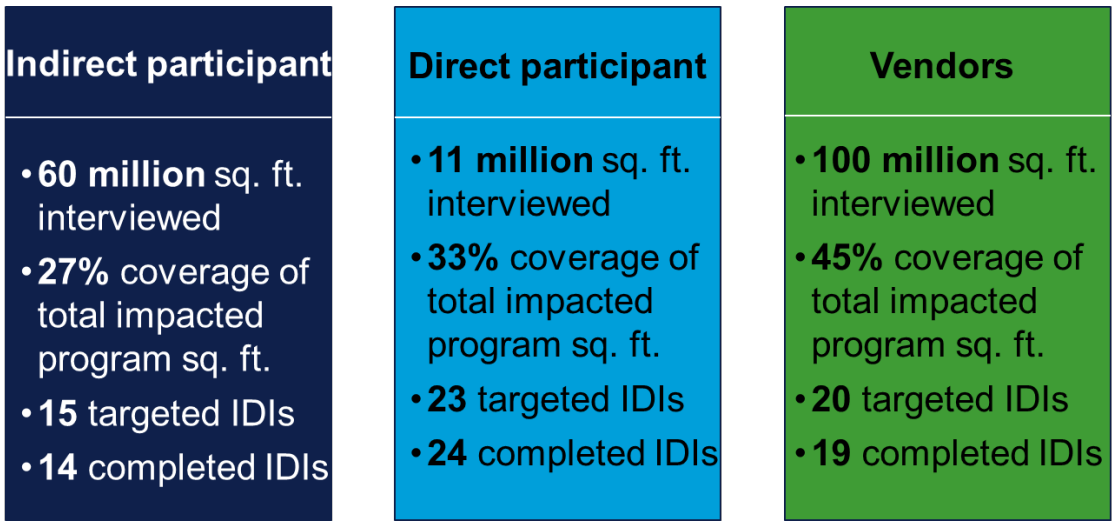
[4] The data used for AI data extraction was based on vendor service reports made available on or before May 14, 2025.

unreported savings, informed interviews and proxy estimates, and verified that measures assigned zero savings were accurate, rather than unknown. Additional details are provided in Section 3.3.1, Vendor report savings review.

Interview outreach and response rates

Primary data collection fielding occurred between March 24 and May 23, 2025. The evaluation contractor team made a minimum of three outreach attempts to each vendor or participant to request an in-depth interview (IDI). At least one of those outreach attempts was made by NYSERDA (either RTEM program staff or the evaluation PM). For large customers or vendors responsible for many sites, NYSERDA RTEM program staff also made at least one phone call outreach attempt. Figure ES-1 provides information regarding the square footage coverage and number of interviews conducted for participant data collection. Interviews covered both direct and indirect benefits questions with all participants. Table ES-2 provides response rates for the nonparticipant data collection activity. Section 3.1.2.1, Data collection outreach and response rates, provides additional information on response rates.

Figure ES-1. Participant in-depth interview coverage



A total of 321 nonparticipating vendors were identified, from which a quota of 8 was targeted. Interviews were planned to be more qualitative since vendors were anticipated to be the smallest source of indirect savings based on program design. Nonparticipating vendors were defined as those not qualified with the program, rather than vendors who were qualified but had not completed projects.

Table ES-2. Response rates for nonparticipant vendor interviews

Activity	Interview Quota	Number of contacts receiving outreach attempts	Completed interviews	Completed interviews as a percent of quota	Response rate
Nonparticipating vendor interviews	8	36	6	75%	17%
Total	**8**	**36**	**6**	**75%**	**17%**

Results

Indirect benefits results

Indirect benefits from the NYSERDA RTEM program stem from building owners and managers using a program-eligible EM technology[5] to identify operational changes or capital upgrades, which are then implemented at their facilities. To count as evaluated indirect benefits, these changes or upgrades must have been influenced by NYSERDA's RTEM program efforts and not included in vendor service reports.[6] Indirect benefits were assessed against NYSERDA's published framework on measuring and evaluating indirect benefits.[7] This framework defines what indirect benefits are and how they'll be evaluated for all NYSERDA programs.

Indirect savings were self reported by both building owners/managers and participating vendors, but their recollections emphasized different segments. Building owners and managers tended to report higher levels of indirect savings at their participating sites and lower levels at their nonparticipating sites. In contrast, participating vendors more often recalled indirect savings at nonparticipating sites and reported fewer at participating sites. No indirect benefits were reported by nonparticipating vendors at nonparticipating buildings.

[5] To be eligible, 1) the EM installation must be capable of monitoring energy usage at hourly interval and at levels more granular than the whole-building; 2) the EM service could not solely consist of software as a service, and 3) it must be installed in a commercial facility that receives its electricity from an investor-owned New York utility.

[6] In contrast, the program team classified savings that occurred at participating sites as direct benefits, regardless of whether these savings were captured in vendor service reports. This difference in classification partially explains why evaluation estimates for indirect benefits are much higher than program-reported values.

[7] https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/PPSER/Program-Evaluation/PM-indirectben-gm-v4-acc.pdf

Table ES-3 summarizes the cumulative overall indirect savings by indirect impact category and market actor.

Table ES-3. Cumulative annual indirect impacts by market actor

Indirect impact category by market actor	Electricity indirect benefits			Natural gas indirect benefits		
	Program-estimated (MWh)	Evaluated indirect (MWh)	Evaluated percent of estimated (%)	Program-estimated (MMBtu)	Evaluated indirect (MMBtu)	Evaluated percent of estimated (%)
Participating organizations at participating buildings	N/A	30,694	N/A	N/A	73,845	N/A
Participating organizations at nonparticipating buildings	N/A	23,012	N/A	N/A	22,317	N/A
Participating vendors at participating buildings	N/A	6,434	N/A	N/A	15,845	N/A
Participating vendors at nonparticipating buildings	N/A	50,561	N/A	N/A	20,865	N/A
Overall	**24,330**	**110,700**	**455%**	**46,831**	**132,871**	**284%**

Direct benefits results

Any measures listed in the vendor reports as both recommended and implemented were accrued as evaluated direct benefits.[8] Interviews were conducted with building owners and managers participating in the RTEM program to verify the installation of recommended and implemented actions.

In a limited number of cases, interviews revealed that some measures listed in the vendor reports as both recommended and implemented had not actually been implemented. These savings were deducted from the evaluated direct benefits totals. Additionally, these interviews identified

[8] For direct benefits, the program team's methodology included savings at participating sites, regardless of whether they were recorded in vendor reports. Because the evaluation team classified participating site savings as indirect if they were not included in vendor reports submitted to NYSERDA, the evaluated estimates for direct benefits are somewhat lower than program-reported values. Even if all participating site savings were reclassified as direct within the evaluation framework, realization rates would remain below 100%, though they would be marginally higher than currently reported.

measures that had been implemented but were not yet documented as such in vendor service reports. When this occurred, the savings from these implemented measures, if they were listed as recommended in vendor reports, were treated as direct benefits and included in the overall savings presented in this section. If the implemented measures were not recommended in vendor reports, the evaluation classified them as indirect benefits.

Table ES-4 summarizes the verified gross savings realization rate (VGSRR) across the current and prior studies for electric and non-electric fuel types.

In the prior studies, the evaluation contractor team excluded vendor reports with incomplete information, such as missing savings values. In the current evaluation, AI was used to extract data from all vendor reports and, where possible, in-depth interviews and proxy estimates were employed to address missing or unreported information. The savings over time approach used in prior evaluations was utilized for the current study to ensure that all savings incurred *during the current evaluation period* are captured for all completed/acquired projects. For additional- context on data considerations, please see Section 3.3.4, Direct benefits analysis method limitations, later in this report.

Table ES-4 shows that the program achieved a 62% VGSRR for electric direct savings for the current evaluation period and a 66% VGSRR for gas direct savings during the current evaluation period. These VGSRR values should be applied for this evaluation period. Additionally, for the current evaluation period, when looking at the evaluated savings as a percentage of estimated baseline consumption, the electric direct savings were evaluated to be 6.08%, and the gas direct savings were evaluated to be 2.17%. Overall, from program inception, the program achieved a 48% VGSRR for electric direct savings and a 47% VGSRR for gas. Note that the VGSRRs reported for the prior evaluation periods are consistent with prior reporting and were not modified by this evaluation's analysis.

Table ES-4. Summary of RTEM program verified direct impacts to the commercial, small to medium business, and industrial sectors

Program period	Program-estimated electricity savings, gross annual (MWh)	Verified electricity savings, gross annual (MWh)	Electric VGSRR	Program-estimated natural gas savings, gross annual (MMBtu)	Verified natural gas savings, gross annual (MMBtu)	Natural gas VGSRR
Q1 2017–Q4 2020	157,959	50,547	32%	72,978	24,083	33%
Q4 2020–Q4 2021	56,383	34,394	61%	24,838	8,445	34%
Q1 2022–Q2 2024 (current evaluation)	**129,090**	**79,889**	**62%**	**72,463**	**47,717**	**66%**
Overall	343,432	164,829	48%	170,279	80,245	47%

To strengthen confidence in the direct benefits results, EDI data[9] were used to verify reasonableness for about 40% of program sites, and an additional 2% of sites had sufficient baseline consumption data from the program.

With the benefit of AI and enhanced data collection approaches in this evaluation, the evaluation contractor team also reviewed the recommended measure quantities and energy savings against NYSERDA's strategic focus areas moving forward. Key takeaways include:

- **HVAC controls.** Of the strategic focus areas, the HVAC controls measure category was recommended in the RTEM program the most, at 1,671 measures or 68% of all recommended measures. The most common measures in this category are temperature setpoint adjustments, occupancy-based controls, installing or calibrating sensors, and equipment runtime adjustments. HVAC controls represent 76% of the recommended electric savings, and 6% of the recommended gas savings.
- **HVAC.** Another strategic focus area shows promise with upgrades to HVAC equipment measures, with 4% of recommended electric savings and 10% of recommended gas savings at only 2% of the recommended measure count. The most common measures in this category include chiller system upgrades, boiler system upgrades, and HVAC equipment upgrades.
- **Motors, pumps, VFDs.** A key finding regarding the recommended savings is that these measures resulted in significant negative savings of 3,130 MWh and positive savings of 3,837 MWh, leading to a net recommended savings of 707 MWh, or 1% of the total

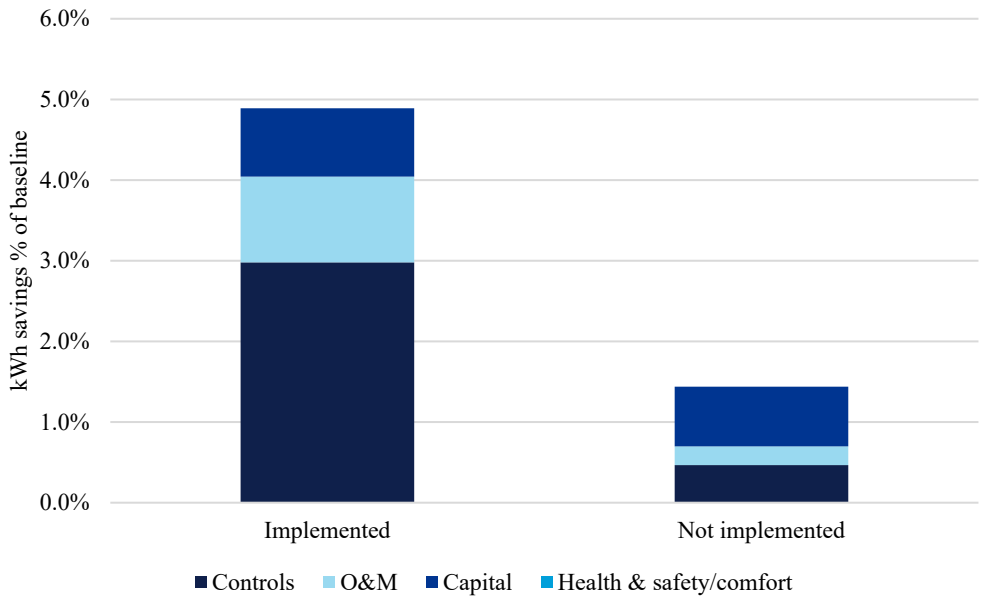
[9] Consumption data obtained from utilities are considered to be an accurate source of information that can be applied to direct benefits evaluation. For this study, a number of publicly available data sources such as OpenNY, IEDR, and NYC LL84 to name a few, were determined to either be insufficiently granular or not relevant for the purposes of verifying direct/indirect benefits at this time.

recommended electric savings. These measures, representing only 5% of the total recommended measures, contributed to a large increase in electric energy consumption but also resulted in significant gas energy savings of 600,592 MMBtu, accounting for 82% of the total recommended gas savings. These measures increase motor, pump, and VFD electric energy consumption to improve thermal space heating efficiency.

- **Battery storage.** Although battery storage is not a strategic focus area, this measure shows a large savings potential, with 9% of the total recommended electric savings from about 0.5% of the recommended measures.

As Figure ES-4 shows, implemented measures have an average electric savings of 0.8% of baseline for capital measures, 3.0% of baseline for controls measures, and 1.1% of baseline for O&M measures. The not-implemented measures have an average electric savings of 0.7% of baseline for capital measures, 0.5% of baseline for controls measures, and 0.2% of baseline for O&M measures. These data indicate that participating customers are implementing the measure(s) with the greatest savings potential(s) first. This figure includes the first-year savings for measures from both the previous and current evaluations.

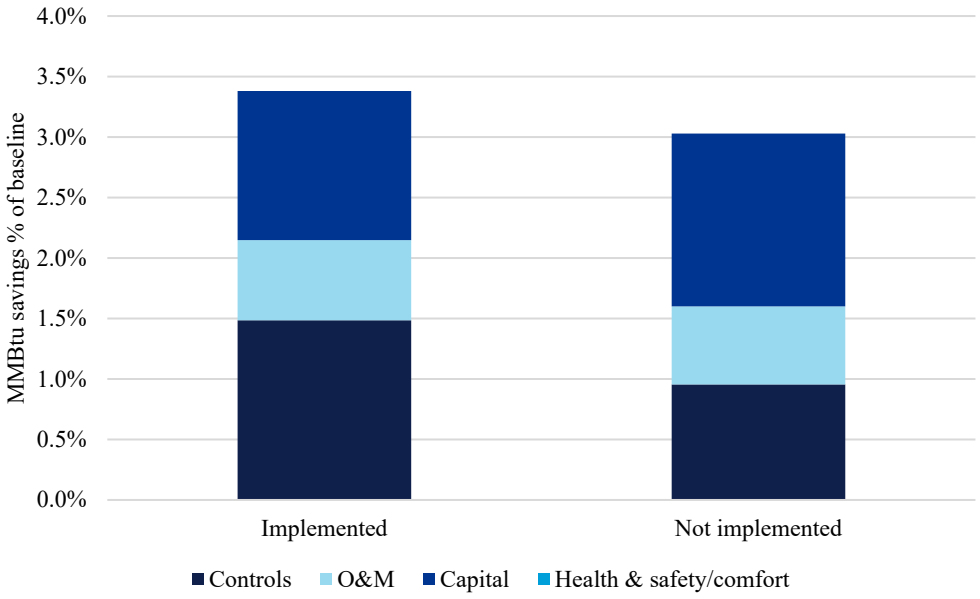
Figure ES-4. Implemented and not implemented average first year electric savings by measure-type



As Figure ES-5 shows, implemented measures have an average gas savings of 1.2% of baseline for capital measures, 1.5% of baseline for controls measures, and 0.7% of baseline for O&M measures. The not-implemented measures have an average gas savings of 1.4% of baseline for capital measures, 1.0% of baseline for controls measures, and 0.6% of baseline for O&M

measures. These data indicate that participating customers are implementing the measure(s) with the greatest savings potential(s) first, except possibly capital measures which could have other associated drivers. This figure includes the first-year savings for measures from both the previous and current evaluations.

Figure ES-5. Implemented and not implemented average first year gas savings by measure-type



Findings and recommendations

Indirect benefits findings and recommendations

Finding 1: The two most significant indirect pathways of influence for the RTEM program are additional and unreported actions by participating organizations at participating buildings, which resulted in 30,694 MWh and 73,845 MMBtu of energy savings, and contributions from participating vendors at nonparticipating buildings, which generated 50,561 MWh and 20,865 MMBtu in savings.

Recommendation 1: Any future versions of the RTEM program, when considered, should support and strengthen these pathways to optimize indirect benefits that could be achieved over time.

NYSERDA Response to Recommendation: Pending. NYSERDA will assess the pathways revealed in this evaluation that apply to future programs that feature characteristics that can be replicated.

Finding 2: Unreported and additional actions from participating organizations at nonparticipating buildings resulted in 23,012 MWh and 22,317 MMBtu of indirect energy savings. Meanwhile, participating vendors at participating buildings contributed 6,434 MWh and 15,845 MMBtu of indirect energy savings. These pathways show somewhat less evidence of indirect benefits for the RTEM program.

Recommendation 2: Future versions of this program, when considered, should explore program interventions to help participating organizations scale RTEM to their portfolio of buildings. This is already occurring in a limited way, and there is room to optimize the pathway of influence.

NYSERDA Response to Recommendation: Implemented. NYSERDA is scaling these considerations for certain subsectors in the RTEM + tenant program.

Finding 3: Although there is evidence of the NYSERDA RTEM program influencing New York utilities' RTEM programs, it is too early to estimate indirect benefits from this influence pathway.

Recommendation 3: As utility RTEM programs scale over time, NYSERDA should revisit and estimate the indirect benefits associated with those projects, since NYSERDA did influence the design and launch of those programs.

NYSERDA Response to Recommendation: Pending. NYSERDA will revisit once utility programs have matured.

Finding 4: Interviews revealed that, on average, each vendor has over 10 RTEM projects that continue using RTEM services after NYSERDA engagement to support non-energy benefits (e.g., building occupant comfort).

Recommendation 4: NYSERDA should consider quantifying non-energy benefits in future versions of this program as part of the evaluation process.

NYSERDA Response to Recommendation: Pending. NYSERDA will be capturing non-energy benefits for future versions of this program.

Direct benefits findings and recommendations

Finding 1: From Q1 2022 through Q2 2024, the RTEM program achieved electric direct energy savings of 79,889 MWh (realization rate: 62%) and non-electric direct energy savings of 47,717 MMBtu (realization rate: 66%). Beyond these direct impacts, the program influenced owners and managers of participating buildings to take additional actions outside of vendor service reports, contributing to notable indirect energy savings. Estimating total savings for this program is challenging to quantify ex post, as effects from specific measures implemented through RTEM systems are often indistinguishable and may not be fully captured in available documentation.

Recommendation 1a: To better capture the full scope of program impacts, consider requiring vendors to report implemented savings, or establishing another systematic method for capturing savings attributable to RTEM systems. Direct savings estimates from vendors who provided this information were higher than those from sites without such reporting, while indirect savings estimates often rely on customer reported actions that can be affected by recall bias. More consistent documentation of implemented actions and associated savings would reduce underestimation risk and provide a clearer picture of the program's influence on operational practices and decision making in the market.

NYSERDA Response to Recommendation: Pending. NYSERDA will revisit during future iterations of the program.

Recommendation 1b: Consider requesting, at program intake, key technical details for equipment monitored by the RTEM system - for example, manufacturer spec sheets, system capacity, square footage or space served, and other relevant characteristics (e.g., for HVAC units, whether they are connected to other systems). While some of this information has been collected during application submission, it has not been part of the program process to identify site by site specific savings. Having these details readily available would be valuable during future evaluations that follow a similar process, as it would help evaluators determine what actions customers took because of the RTEM system and better understand the magnitude of associated savings. Collecting this information at intake is generally more efficient and less burdensome than attempting to gather it retrospectively during evaluation.

NYSERDA Response to Recommendation: Pending. NYSERDA will consider this feature for future program iterations.

Finding 2: The RTEM program achieved savings in different sectors, showing the flexibility of the system to address complex situations. For forecasting purposes, it is important to understand differences in outcomes in terms of percent savings in different sectors. EM systems in commercial, retail, and institutional facilities reported a focus on building schedules and savings came primarily from HVAC settings and maintenance. Customer-reported goals for EM systems in these facilities were tenant comfort and energy savings. EM systems in industrial and agricultural facilities were focused on industrial processes, with customers indicating a desire to reduce the price per unit of their products. While reductions in cost per unit can come from reduced energy use, the facilities reported taking other actions that reduced cost without a reduction in energy use. While the sample size for industrial facilities was not large enough to say definitively, the study found less savings as a percentage of consumption in industrial facilities than in other sectors.

Recommendation 2: Consider forecasting savings based on facility type with different expectations for savings as a percentage of consumption in sectors who use the EM system in different ways.

NYSERDA Response to Recommendation: Implemented. This is already a feature of program reporting where aligned with facility type and/or sector.

Finding 3: Electronic Data Interchange (EDI) data were successfully obtained for approximately 40% of sites. For the remaining sites, no usable data were returned from the EDI request. In addition, while the program collected some pre-installation consumption data, these data were only sufficient to support a sanity check for about 2% of sites, as the vast majority included just a single month of consumption. The lack of complete, standardized baseline data significantly limited opportunities to conduct a formal billing analysis to derive savings.

Recommendation 3: To support robust evaluation and long-term market insights, the program could consider requesting EDI data for all participating sites for each program year. If adopted, the program could extract account numbers and points of delivery (PoDs) from applications and submitted bills/proof of account upon program intake then immediately attempt to acquire

baseline data to confirm the accuracy of the account numbers and PoDs in the tracking data. This will ensure data is available for savings estimation and evaluation. Note: there are some measures where billing data may be unable to provide direct quantification of savings, for example early identification of a system needing repair will often not have a period operating in poor condition to support billing or even advanced metering infrastructure–based estimation of savings because the increase in usage was avoided. Despite this risk, having more of the consumption data can enable better savings estimates even when used indirectly and can provide better baseline consumption estimates than the current square footage estimates provide. This, in turn, strengthens the program's ability to demonstrate its role in transforming market practices and decision making over time.

NYSERDA Response to Recommendation: Pending. Some, but not all NYSERDA programs will have this feature moving forward.

Finding 4: Vendor service reports provide the best available information for measure installation and savings verification for the RTEM program and thus are the primary source for evaluation of direct savings. This is a key risk for the program, as vetting of the savings claims with engineering and baseline assessments was not possible. As described previously, customer reports suffer from recall bias, and billing data was largely unavailable or incomplete. The evaluation contractor team confirmed that vendor-reported implementations were completed and identified indirect benefits from participating sites, but where savings magnitudes were not reported, evaluator estimates of these savings may be lower than actual savings.

Recommendation 4: Continue to assess available methods for evaluation of the RTEM program. For instance, concurrent evaluation of targeted sites with large estimated savings and multi-site projects within two years of EM system installation would have a much higher likelihood of capturing measure-level post-installation information and participating organization intentions for future installations, associated savings data, and non-routine events from major equipment upgrades or industrial process improvements. Similarly, utility billing data would be more readily available through an EDI request. Customer and vendor interviews at this early stage would provide feedback to vendors on the critical importance of vendor service report data for evaluation of program direct benefits and capture more real-time indirect benefits as they are planned and occur.

NYSERDA Response to Recommendation: Implemented. NYSERDA is implementing pre-install interviews on select programs.

Finding 5: Vendor reports often included activities that might incur cost savings through diagnostics and fault detection events, but did not report any annual energy savings from such measures. NYSERDA assumes modeled energy savings for all fuels serving a site, so the presence of these activities can substantially depress realization rates and projected savings as a percentage of estimated baseline.

Recommendation 5: Consider including a post-installation verification step to confirm actual vendor-reported and installed energy-saving measures upon project completion or as part of the acquired savings process. This step will help verify actual baseline energy consumption and vendor-reported energy savings from installed measures. Post-installation verification will also identify instances where only diagnostics or fault-detection activities were implemented, which result in cost savings for a site but not significant annual energy savings.

NYSERDA Response to Recommendation: Implemented. NYSERDA is implementing a post-installation verification on select programs.

1 Introduction

This report presents a comprehensive program evaluation of the NYSERDA Real Time Energy Management (RTEM) program, assessing both direct and indirect impacts across the commercial, small to medium business, and industrial sectors throughout the program's duration. The evaluation focuses on the total achieved savings and market influence of Energy Management (EM) technologies that were installed as part of the program. The report builds on prior program evaluation study[10] results with the goal of assessing the full direct and indirect impacts of the program from inception in Q1 2017 through Q2 2024, including all projects until the discontinuation of application acceptance for the commercial sector in Q4 2020. NYSERDA hypothesized that the program has influenced installations at commercial properties outside of the program, and that vendors have influenced the installation of measures at participating sites that are not recorded within vendor service reports. This report assesses these indirect impacts and market transformation efforts for all years of the program.

1.1 Program description

The NYSERDA RTEM program supports deployment and use of EM technology, an enabling technology for the management of building energy consumption from a combination of building data collection and control systems (e.g., meters, sensors, equipment feeds, local/supervisory controllers), analytics, and building data information services. The supported EM systems work in real time to monitor building systems' current and historical performance data. Data points such as set points, power loads, flow rates, temperature, and humidity are collected and processed on-site, on a cloud-based server, or a combination of the two to fine-tune the building energy system operations and identify capital projects. Depending on the technology, systems can also provide predictive analytics, fault detection and diagnostics and performance optimization.

The RTEM program provides cost-sharing incentives for both the EM information-gathering systems and the vendors reviewing the captured data. Incentives are based on the project cost (30% for up to a five-year vendor contract) and are not directly proportional to energy savings achieved by the project. Statewide support was provided through vendor qualification and support

[10] https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/PPSER/Program-Evaluation/2023-09-22-Matter-No-16-02180-NYSERDA-CEF-RTEM-Phase-III-Impact-Report.pdf

for retrofit planning and design work. Further, NYSERDA collaborated with utilities to share lessons learned and market opportunities for continued support of EM systems and services.[11,12]

The program initially targeted existing commercial buildings, strategically identifying subsectors of likely uptake as commercial office, retail, university/college, nonprofit, and healthcare. These subsectors were considered most likely to have the human resources necessary to capitalize on the potential of EM due to pre-existing penetration of building management systems through large, centrally managed buildings or portfolios.

The RTEM program strategy sought to build on NYSERDA's reputation as a source of objective and credible technical information. The program spurs demand for EM services by providing independent technical advisement to building owners; gathering, analyzing, and sharing learning and successes related to use of the technology; and demonstrating the value proposition to stimulate investor confidence and replication. EM systems and services that meet the unique needs of building owners are intended to catalyze private investment to improve energy performance.

1.2 Evaluation objectives and methods

The overall goal of this study is to independently assess the direct and indirect impacts and market transformation achieved by the NYSERDA RTEM program through deployment of EM technology since program inception. Table 1-1 summarizes the overarching objectives of this study with a summary of data collection methods used to meet those objectives. Evaluation methods are detailed in Section 3.

[11] SunEdison RTEM program: https://www.coned.com/en/save-money/rebates-incentives-tax-credits/rebates-incentives-tax-credits-for-commercial-industrial-buildings-customers/real-time-energy-management-systems

[12] National Grid RTEM program: https://www.nationalgridus.com/media/pdfs/bus-ways-to-save/2023_ngn_info-sheet_rtem.pdf

Table 1-1. Study objectives, purpose, and methods

Objective	Purpose	Method
Assess indirect impacts and market effects of Energy Management technology installed through or influenced by the RTEM program	Determine program influence on market actors, including participating building owners/managers, participating vendors, nonparticipating vendors, and other utility programs	• Vendor round tables • Interviews with building owners/managers, participating vendors, nonparticipating vendors, and other utility program managers
Continue collection of direct impacts of Energy Management technology installed through the RTEM program	Verify first-year gross savings for program participants: evaluated savings as a percent of evaluated baseline, realization rate	• Vendor service report engineering reviews • Building consumption data review, with IPMVP Option C: Whole Building Verification attempted for each site[13] • Participant interviews

[13] In all cases, data gaps prevented full Option C analysis; however, available building-level consumption data were used as a reasonableness check on measure-level reported savings, rather than to confirm the presence or absence of additional savings.

2 Results, findings, and recommendations

This section documents results, findings, and recommendations for indirect and direct impacts to the commercial, small to medium business, and industrial sectors. Figure 2-1 summarizes the key results across direct and indirect impacts.

Figure 2-1. Overall results by vendor type

Software Overlay Only

Indirect savings ratios (electric):	Indirect savings ratios (gas):	Direct verified savings (% of baseline energy consumption, electric):	Direct verified savings (% of baseline energy consumption, gas):
51%	**80%**	**10.21%**	**4.13%**

Overall commentary: Most vendors in the software overlay category were also classified under the automated system optimization (ASO) reporting focus. These vendors recommended more HVAC controls than other vendor types, leading to higher-than-average direct impacts. Some FDD reporting vendors were also included in this group; however, their emphasis on price reduction rather than energy savings reduced the overall direct savings results. Many of the vendors reporting indirect savings were in the software

Software Overlay + Controls Install

Indirect savings ratios (electric):	Indirect savings ratios (gas):	Direct verified savings (% of baseline energy consumption, electric):	Direct verified savings (% of baseline energy consumption, gas):
14%	**12%**	**0.47%**	**0.00%**

Overall commentary: Most software overlay + controls vendors were also classified under the fault detection and diagnostics (FDD) reporting focus. Vendors in this category frequently emphasized price reduction over energy savings. The limited direct energy savings observed in this group came primarily from vendors who also had an ASO reporting focus. Further, this vendor category contributed only a small amount to the indirect savings estimates.

ASO Reporting Focus Only

Indirect savings ratios (electric):	Indirect savings ratios (gas):	Direct verified savings (% of baseline energy consumption, electric):	Direct verified savings (% of baseline energy consumption, gas):
49%	**62%**	**26.2%**	**5.47%**

Overall commentary: ASO reporting focus only vendors recommended more HVAC controls measures than other vendor types, and recommended the largest proportion of energy savings from HVAC controls measures, with 85.1% direct electric and 52.7% direct gas savings of the total recommended HVAC controls savings. Nearly all vendors with an ASO reporting focus reported sources of indirect savings.

FDD Reporting Focus Only

Indirect savings ratios (electric):	Indirect savings ratios (gas):	Direct verified savings (% of baseline energy consumption, electric):	Direct verified savings (% of baseline energy consumption, gas):
17%	**24%**	**0.00%**	**0.00%**

Overall commentary: FDD vendors focused on price reduction (not energy savings). Approximately only half of FDD reporting focus vendors indicated sources of indirect savings.

ASO + FDD Reporting Focus

Indirect savings ratios (electric):	Indirect savings ratios (gas):	Direct verified savings (% of baseline energy consumption, electric):	Direct verified savings (% of baseline energy consumption, gas):
48%	**68%**	**4.33%**	**0.00%**

Overall commentary: Vendors who focused on both ASO and FDD achieved lower average direct savings per measure than the ASO reporting focus only. Approximately half of the vendors in this category reported indirect savings.

Figure 2-1. Overall results by vendor type, continued

OEM Controls

Indirect savings ratios (electric): **17%**	Indirect savings ratios (gas): **18%**	Direct verified savings (% of baseline energy consumption, electric): **0.00%**	Direct verified savings (% of baseline energy consumption, gas): **0.00%**

Overall commentary: Vendors in the original equipment manufacturer (OEM) controls category did not report any implemented measures in their reports. Interviews confirmed that the measures listed in the reports had not yet been implemented. However, vendors noted the implementation of other measures not captured in the reports. These additional actions were included in the estimates of indirect benefits.

Overall

Indirect savings ratios (electric): **22%**	Indirect savings ratios (gas): **26%**	Direct verified savings (% of baseline energy consumption, electric): **6.08%**	Direct verified savings (% of baseline energy consumption, gas): **2.17%**

Overall commentary:

- EM systems in commercial, retail, and institutional facilities reported a focus on building schedules and savings came primarily from HVAC settings and maintenance, while EM systems in industrial and agricultural facilities were focused on industrial processes and customer desire to reduce the price per unit of their products.
- Unreported actions included adding sensors, equipment system optimization, energy management system improvements, lighting, cooling tower upgrades and general power reductions.

Across all vendor types where interviews were conducted, there were reports of non-energy benefits resulting from RTEM projects. On a weighted average basis, just over 10 projects per vendor continue to use the deployed services for non-energy benefits even after the conclusion of NYSERDA's engagement, typically for occupant comfort. This demonstrates that the value of RTEM extends beyond energy savings, with vendors and customers recognizing ongoing operational and comfort-related advantages. Additional metrics on non-energy benefits are presented in Section 2.1.10, NYSERDA RTEM program market indicators.

2.1 Indirect benefits results

Indirect benefits from the NYSERDA RTEM program stem from building owners and managers using a program-eligible EM technology[14] to identify operational changes and/or capital upgrades, which are then implemented at their facilities. To count as indirect benefits, these changes/upgrades must have been influenced by NYSERDA's RTEM program efforts. If a change or upgrade has been confirmed to have received an incentive from other NYSERDA programs or New York utility RTEM programs (offered by Con Edison and National Grid), it is not counted again as an indirect benefit from the NYSERDA program. However, due to the

[14] To be eligible, 1) the EM installation must be capable of monitoring energy usage at hourly interval and at levels more granular than the whole-building; 2) the EM service could not solely consist of software as a service, and 3) it must be installed in a commercial facility that receives its electricity from an investor-owned New York utility.

reporting timeline, a limited number (less than five) interviewees self-reported that certain changes/upgrades were incentivized outside of the RTEM program that could not be verified. In those cases, reported changes/upgrades are included in the indirect benefits estimation.

As noted earlier, evaluation estimates for indirect benefits are greater than program estimates partially because they include savings that occurred at participating sites but were not captured in vendor reports. Program estimates for savings at participating sites were included in their direct benefits total. summarizes overall indirect savings by indirect impact category and market actor.

Table 2-1. Cumulative annual indirect impacts by market actor

Indirect impact category by market actor	Electricity indirect benefits			Natural gas indirect benefits		
	Program-estimated (MWh)	Evaluated indirect (MWh)	Evaluated percent of estimated (%)	Program-estimated (MMBtu)	Evaluated indirect (MMBtu)	Evaluated percent of estimated (%)
Participating organizations at participating buildings	N/A	30,694	N/A	N/A	73,845	N/A
Participating organizations at nonparticipating buildings	N/A	23,012	N/A	N/A	22,317	N/A
Participating vendors at participating buildings	N/A	6,434	N/A	N/A	15,845	N/A
Participating vendors at nonparticipating buildings	N/A	50,561	N/A	N/A	20,865	N/A
Overall	**24,330**	**110,700**	**455%**	**46,831**	**132,871**	**284%**

2.1.1 Indirect benefits by year

Table 2-2 provides the overall indirect savings values broken out by year.

Table 2-2. Indirect benefits by year

Year	Electric indirect savings (MWh)	Gas indirect savings (MMBtu)
2018	8,677	5,757
2019	14,662	19,204
2020	14,004	15,481
2021	45,024	56,337
2022	17,755	22,365
2023	9,355	12,139
2024	1,224	1,589
Overall	**110,700**	**132,871**

2.1.2 Indirect benefits by sector

The evaluation contractor team found that six facility types are mostly represented in the sample and population that are available for domains analysis and reporting: colleges and universities, commercial offices, commercial retail, food and beverage, healthcare, and K–12 schools. The remainder of the facility types representing fewer sites were grouped under "other." Table 2- shows the analysis sample and population spread across the four sector types with indirect savings by sector.

Table 2-33. Indirect benefits by sector

Evaluation assigned sector	Number of project applications in conducted interviews	Total number of applications in the population [b]	Indirect savings ratio (electric)	Indirect savings CI (electric)	Indirect savings ratio (gas)	Indirect savings CI (gas)
College/University	10	25	3%	±4%	978%	±901%
Commercial Office	23	141	23%	±22%	4%	±4%
Commercial Retail	7	55	54%	±74%	104%	±169%
Food/Beverage	2	10	0%	±0%	0%	±0%
Healthcare	1	33	0%	±0%	0%	±0%
K-12 Schools	3	68	2%	±3%	0%	±0%
Other [a]	4	50	3%	±2%	11%	±21%
Overall	**61**	**382**	**17%**	**±11%**	**132%**	**±145%**

a The "Other" category includes the following facility types: chemicals, hospitality, manufacturing, government, not for profit, and miscellaneous other.

b In some cases, an application might have multiple buildings assigned to different sectors. For the purposes of this summary, applications were assigned to the sector with the greatest impacted square footage based on the program tracking data.

2.1.3 Indirect benefits by vendor type

The evaluation contractor team grouped the sites by vendor categories on the services and focus of projects completed by vendors for the RTEM program. These categories include software overlay only, automated system optimization (ASO) focus, fault detection and diagnostics (FDD) focus, both ASO and FDD focus, and vendors who develop building automation systems to customers which we are categorizing as OEM controls only vendors. Table 2- shows the indirect benefits ratios by the different vendor classification categories.

Table 2-44. Indirect benefits by vendor type

Stratum	Number of interviewed vendors	Indirect savings ratio (electric)	Indirect savings CI (electric)	Indirect savings ratio (gas)	Indirect savings CI (gas)
Software Overlay Only	10	51%	±58%	80%	±105%
Software Overlay + Controls Install	6	14%	±12%	12%	±22%
ASO Reporting Focus Only	16	49%	±23%	62%	±35%
FDD Reporting Focus Only	12	17%	±25%	24%	±26%

Stratum	Number of interviewed vendors	Indirect savings ratio (electric)	Indirect savings CI (electric)	Indirect savings ratio (gas)	Indirect savings CI (gas)
AS + FDD Reporting Focus	9	48%	±21%	68%	±43%
OEM Controls Only	3	17%	±29%	18%	±23%
Overall	**19**	**22%**	**±25%**	**26%**	**±27%**

2.1.4 Indirect benefits from participating organizations at participating buildings

RTEM program participating buildings received program funding for the installation of eligible EM technology and are owned by participating organizations. Participating organizations may have installed energy-saving measures at their facilities, directly enabled by RTEM and outside of the program, or may own or manage other buildings outside of the participating buildings, for which benefits are measured in a subsequent category. Indirect benefits for this group are based on *additional energy savings actions installed in participating buildings that were not reported to NYSERDA in vendor service reports*.

NYSERDA requires RTEM participating vendors who supported participating organizations in installing an EM system to provide quarterly, semi-annual, or annual service reports on energy savings recommendations and implemented actions based on data and analytics that the installed EM system provided. If any RTEM-identified energy savings actions were implemented and not reported to NYSERDA in the vendor-provided service reports, then the evaluation contractor team considered those actions to fall under the indirect benefits category. The evaluation contractor team interviewed participating vendors and participating organizations to ascertain whether any RTEM-identified and implemented actions were unreported in vendor service reports.

The RTEM program influenced managers of participating buildings to complete additional actions outside of the program, and those actions were associated with notable energy savings. The evaluation contractor team interviewed 38 owners and managers of participating buildings to identify *additional energy savings actions installed in participating buildings that were not reported to NYSERDA in vendor service reports*, resulting in information on 30

applications that could be used in this analysis.[15] The interviews revealed that facility staff of 37% of participating buildings in the sample implemented RTEM-identified energy savings actions that were not reported to NYSERDA. Generally, unreported actions included: adding sensors, equipment system optimization, energy management system improvements, lighting, cooling tower upgrades, and general power reductions.

Table 2- and Table 2- summarize the program indirect-to-direct savings ratios and estimated indirect benefits from the adoption of RTEM technology at participating sites by participating organizations.

Table 2-5. Indirect impact ratio results: participating organizations at participating buildings

Ratio label	N	Ratio	Confidence interval
Indirect savings ratio (Electric)	33	12%	9%
Indirect savings ratio (Gas)	33	53%	65%

Table 2-6. Indirect energy savings results: participating organizations at participating buildings[16]

	Program estimated savings	VGSRR	Evaluated installed direct savings	Indirect ratio	Indirect savings
Electric savings (MWh)	547,957	48%	263,019	12%	30,694
Gas savings (MMBtu)	296,914	47%	139,549	53%	73,845

2.1.5 Indirect benefits from participating organizations at nonparticipating buildings

Building owners and managers with a portfolio of buildings may have participated in the RTEM program with a subset of their portfolio, then expanded the technology application and/or related energy saving measures to nonparticipating buildings. Indirect benefits for this group are based

[15] On review of the interview results, the evaluation contractor team found that three of the applications were out of scope (not within this evaluation's period) for this analysis.

[16] Evaluated installed direct savings will not match the verified gross annual savings for direct benefits because the indirect savings analysis considered all savings, whether acquired or not, while the direct savings analysis only considered acquired savings.

on adoption of eligible EM technology at sites *without program funding but influenced by program participation.*

The RTEM program influenced very few participating organizations to install an EM system in their nonparticipating buildings, resulting in limited energy savings associated with actions identified from those EM installations. The evaluation contractor team interviewed 28 owners and managers of participating buildings (covering 33 applications and 38 total project sites, 30 of which applications could be used for this analysis) to identify whether they installed and used the EM technology in their nonparticipating buildings.[17] Seven percent of interviewed participating organizations (two out of 28 owners and managers) reported they had installed the EM technology at nonparticipating buildings in New York without NYSERDA RTEM program funding. These participating organizations together installed an EM system at five nonparticipating building sites. One of the installations received funding from the New York utility RTEM programs.

On average, participating organizations offered a rating of 7.4 for the RTEM program influence and a rating of 6.7 for program-affiliated vendor influence on the organization's decision to install EM technology at nonparticipating building site(s).[18] Generally, the RTEM program influence was slightly more important than program-affiliated vendor influence. That is, when asked to allocate 10 points for influence across the RTEM program, program-affiliated vendor, or other factors, on average, participating organizations allocated 4.7 influence points for program, 4.3 influence points for program-affiliated vendor, and 2.4 influence points for other factors. When asked about the other factors that influenced their decision to participate, interviewees attributed credit to their own organizations.

Additional input from the participating organizations suggested the RTEM-identified implementation of energy savings actions did not differ significantly between the organizations' nonparticipating and participating building sites. Section 3.2, Indirect benefits analysis, provides details on how this information was leveraged to estimate indirect benefits.

[17] On review of the interview results, the evaluation contractor team found that three of the applications were out of scope (not within this evaluation's period) for this analysis.

[18] Respondents gave a rating using a scale from 0 to 10, where 0 meant not all influential and 10 meant extremely influential.

Table 2- provides a summary of program indirect-to-direct savings ratios from participating organizations who have adopted RTEM technology at nonparticipating buildings. Table 2- provides the resulting indirect energy savings.

Table 2-7. Indirect impact ratio results: participating organizations at nonparticipating buildings

Ratio label	N	Ratio	Confidence interval
Indirect savings ratio (electric)	33	9%	14%
Indirect savings ratio (gas)	33	16%	25%

Table 2-8. Indirect energy savings results: participating organizations at nonparticipating buildings

	Program estimated savings	VGSRR	Evaluated installed direct savings	Indirect ratio	Indirect savings
Electric savings (MWh)	547,957	48%	263,019	9%	23,012
Gas savings (MMBtu)	296,914	47%	139,549	16%	22,317

Overall, Table 2- provides a summary of program indirect energy savings of both participating and nonparticipating sites as reported by participating organizations.

Table 2-9. Total indirect energy savings from participating organizations

	Evaluated installed direct savings	Indirect savings: participating buildings	Indirect savings: nonparticipating buildings	Total indirect savings	Percent of evaluated savings
Electric savings (MWh)	263,019	30,694	23,012	53,706	20%
Gas savings (MMBtu)	139,549	73,845	22,317	96,162	69%

2.1.6 Indirect benefits from participating vendors at participating buildings

RTEM vendors provided support to program participating buildings to receive program funding for the installation of eligible EM technology. These participating organizations may have installed additional energy-saving measures at their facilities, beyond those directly enabled by RTEM and outside of the program. Indirect benefits for this group are based on additional energy savings actions installed in participating buildings that were not reported to NYSERDA in vendor service reports.

The RTEM program influenced vendors of participating buildings to understand additional actions taken outside of the program, and those actions were associated with some energy savings. The evaluation contractor team interviewed 19 vendors of participating buildings to identify additional energy savings actions installed in participating buildings that were not reported to NYSERDA in vendor service reports, results from 18 of which could be used to inform this analysis.[19] The interviews revealed that, on average, vendors identified 0.34 additional energy efficiency opportunities per participating site.

Table 2- and Table 2- summarize the program indirect-to-direct savings ratios and estimated indirect benefits from the adoption of RTEM technology at participating sites as reported by participating vendors.

Table 2-10. Indirect impact ratio results: participating vendors at participating buildings

Ratio label	N	Ratio	Confidence intervals
Participant vendor indirect savings ratio (electric)	19	2%	2%
Participant vendor indirect savings ratio (gas)	19	11%	12%

Table 2-11. Indirect energy savings results: participating vendors at participating buildings

	Program estimated direct savings	VGSRR	Evaluated installed direct savings	Indirect ratio	Indirect savings
Electric savings (MWh)	547,957	48%	263,019	2%	6,434
Gas savings (MMBtu)	296,914	47%	139,549	11%	15,845

2.1.7 Indirect benefits from participating vendors at nonparticipating buildings

Indirect benefits from the adoption of EM technology at nonparticipating building(s) originated from RTEM participating vendor sales. Benefits from these distinct groups of vendors are presented below.

The evaluation contractor team interviewed 19 participating vendors to identify whether they installed and used the EM technology in their nonparticipating buildings, results from 18 of

[19] On review of the interview results, the evaluation contractor team found that one of the vendors was responsible only for sites out of scope (not within this evaluation's period) for this analysis.

which could be used to inform this analysis.[20] Fifty-three percent (53%) of interviewed participating vendors reported they had sold and installed EM technology to a nonparticipating organization. These participating vendors together installed 267 EM systems at nonparticipating buildings that were managed by nonparticipating organizations. Two of those installations received funding from the New York utility RTEM programs.

The RTEM program appeared to have influenced participating vendors' sales to nonparticipating organizations. Eighty-four percent (84%) of interviewed participating vendors noted they have been recommending EM more to their clients since their involvement with the program. When asked how many EM service contracts they would have held if the NYSERDA RTEM program was not around, on average, they noted they would have likely held less than half (46%) of their total portfolio. They also noted, on average, a rating of 5.5 for program influence on their company's practice of recommending EM technology, and a rating of 7 for their influence on the customer's decision to install the system and encourage them to act on RTEM-identified energy savings actions, respectively.[21]

Additional input from the participating vendors suggested the implementation of EM-identified energy savings actions did not significantly differ between the organizations' nonparticipating and participating buildings. However, several vendors said that NYSERDA-incentivized sites tended to be larger overall projects than non-incentivized sites. Section 3.2, Indirect benefits analysis, provides details on how this information was leveraged to estimate indirect benefits.

Table 2- and Table 2- summarize the program indirect-to-direct savings ratios and estimated indirect benefits from the adoption of RTEM technology at nonparticipating site by participating vendor organizations.

[20] On review of the interview results, the evaluation contractor team found that one of the vendors was responsible only for sites out of scope (not within this evaluation's period) for this analysis.

[21] Respondents gave a rating using a scale from 0 to 10, where 0 meant not all influential and 10 meant extremely influential.

Table 2-12. Indirect impact ratio results: participating vendors at nonparticipating buildings

Ratio label	N	Ratio	Confidence intervals
Participant vendor indirect savings ratio (electric)	19	19%	±25%
Participant vendor indirect savings ratio (gas)	19	15%	±22%

Table 2-13. Indirect energy savings results: participating vendors at nonparticipating buildings

	Program estimated savings	VGSRR	Evaluated installed direct savings	Indirect ratio	Indirect savings
Electric savings (MWh)	547,957	48%	263,019	19%	50,561
Gas savings (MMBtu)	296,914	47%	139,549	15%	20,865

Table 2- provides a summary of program indirect energy savings of both participating and nonparticipating sites as reported by participating vendors.

Table 2-14. Total indirect energy savings from participating vendors

	Evaluated installed direct savings	Indirect savings: participating buildings	Indirect savings: nonparticipating buildings	Total indirect savings	Percent of evaluated savings
Electric savings (MWh)	263,019	6,434	50,561	56,995	22%
Gas savings (MMBtu)	139,549	15,845	20,865	36,710	26%

Additionally, Table 2- provides the total program indirect energy savings of both participating and nonparticipating sites as reported by both participating vendors and participating organizations.

Table 2-15. Total indirect energy savings from participating organizations and participating vendors

	Evaluated installed direct savings	Total indirect savings: participating organizations	Total indirect savings: nonparticipating organizations	Total indirect savings	Percent of evaluated savings
Electric savings (MWh)	263,019	53,706	56,995	110,700	42%
Gas savings (MMBtu)	139,549	96,162	36,710	132,871	95%

2.1.8 Indirect benefits from nonparticipating vendors at nonparticipating buildings

The evaluation contractor team compiled a list of 321 vendors based on data from NYSERDA (vendors who applied but did not complete projects) and LBNL (Smart Energy Analytics Campaign vendor list). The evaluation contractor team initially attempted data gathering of web pages with agreed search terms but found inadequate results. Subsequently, a data gathering tool was developed using the compiled list of nonparticipating vendors to extract relevant data on those vendors potentially selling RTEM-eligible systems in New York. The AI algorithm extracted the data to identify vendors selling RTEM-eligible products, and the final list was provided to NYSERDA program staff to verify participation in the RTEM program. For any confirmed nonparticipating vendors, Pitchbook was used to map the number of employees as a proxy for organization size (small, medium, large, or unknown). From this, a sample was drawn of eight targeted organizations for interviews (two from each organization size).

The NYSERDA RTEM program has not influenced nonparticipating EM vendor product offerings and sales. The evaluation contractor team interviewed six nonparticipating vendors to identify whether they sold and installed the EM technology in nonparticipating buildings. These vendors were not qualified by the program as eligible providers. Of six interviewed nonparticipating vendors, five offered EM-type technology and one no longer offers that technology. Of the five nonparticipating vendors still offering EM technology, three were unaware of the NYSERDA RTEM program and/or New York utility RTEM programs. The two who were aware of the NYSERDA RTEM program (and unaware of utility RTEM programs) noted their EM-technology type offerings were not influenced by the NYSERDA RTEM program in any way. One of the two aware vendors explained they did not want their offerings to depend on the incentive program funds since those typically "dry out." The other noted they also do not design their offerings around incentive programs since they perceive that many customers do not leverage program incentives.[22] Collectively, these findings suggest the NYSERDA RTEM program activities have not influenced nonparticipating EM vendor product offerings and sales.

[22] This vendor also noted that their main customers are "integrators." Integrators are firms that subscribe (pay to use) the EM software to expand their services to end-users regarding building optimization and monitoring solutions. This business model, where EM vendors are selling their products to integrators and not directly to end-users, was also noted by program-affiliated or participating vendors.

2.1.9 Indirect benefits through influence of NYSERDA on New York utility RTEM programs

The NYSERDA RTEM program appears to influence New York utilities' RTEM programs. Utility staff interviews and email exchanges between NYSERDA and utilities confirmed that NYSERDA and New York utility staff discussed and shared information on NYSERDA's RTEM program design and execution. Staff from one utility reported that NYSERDA's ability to build the EM portfolio of projects and savings greatly influenced their decision to offer their version of the RTEM program. Staff of another utility reported that the NYSERDA RTEM program somewhat influenced their decision to launch their own RTEM program, while noting that if the NYSERDA RTEM program was not around, their own launch of RTEM would likely have been postponed.

Although there is evidence of the NYSERDA RTEM program influencing New York utilities' RTEM programs, it is too early to estimate indirect benefits from this influence pathway. The New York utilities revealed that participation in their utility RTEM programs is relatively nascent. Utility staff reported that they are looking to evaluate their RTEM programs as soon as enough participants have completed the participation journey or demonstrated RTEM-associated energy savings. Staff of one utility noted they needed at least 30 participants in their RTEM program to be far along on their participation journey to evaluate their program, and said they are close but not there yet. The other utility expressed a similar sentiment.

Additionally, interviews with the NYSERDA RTEM participating organizations and participating vendors did not reveal any nonparticipating buildings with RTEM that these market actors were involved with which these market actors received a New York utility RTEM incentive. This further supports utility feedback (referenced above) that very few utility RTEM projects are underway.

Collectively, these findings indicate that it is too early to estimate indirect benefits from this influence pathway.

2.1.10 NYSERDA RTEM program market indicators

This section provides additional findings on program's logic model outcome indicators as indicated in Table 2-.

Table 2-16. Indirect savings through direct influence program participant adoption at participating sites

Outcome	Indicator	Result
Increased awareness of using EM to support capital project planning	Percent of building owners/managers aware/knowledgeable of RTEM long-term capital project planning	88%
	Percent of owners/managers participating in NYSERDA Training courses	N/A
Nonparticipating vendor awareness and use of EM technology, and RTEM program [a]	Percent of providers aware of RTEM program resources, programmatic criteria, and standards by providers (n = 5)	40%
	Number of EM providers	321 vendors
	Percent of offerings with RTEM (n = 6)	80%
Increased use of EM	Percent of owners/managers implementing optimal start/stop	52%
	Percent of owners implementing fault detection and diagnostics (FDD)	80%
Customer confidence in EM results	Percent (or number) of implemented measures installed after NYSERDA engagement	1.051 [b]
Increased use of EM for non-energy benefits	Percent of tenants including RTEM/EM stipulations within lease requests	4%
	Percent reduction in tenant hot/cold calls	30%
	Percent of owners/managers implementing occupancy-based management	44%
Variables affecting persistence of RTEM service contracts	Percent RTEM service contracts at least 5 years in duration	76%
Percent of RTEM projects that use services for non-energy benefits (e.g., long-term asset management, capital investment strategies, risk mitigation analyses)	Number of RTEM projects that use services for non-energy benefits after NYSERDA engagement	10.6 [c]
Utilization of RTEM data sets to advance efforts at demand reduction and peak load shaving	Percent of vendors implementing demand reduction and peak load shaving for replication sites and other projects within the vendor portfolio	46%
Demonstrated energy savings/O&M benefits from RTEM activities	Ratio of efficiency control measures (ECM) identified: ECMs implemented in addition to those recommended during NYSERDA engagement	50%
RTEM providers identify and act on energy efficiency opportunities	Number/type of additional energy efficiency opportunities identified by RTEM providers (current and former)	0.34 [b]

a Nonparticipating vendor results were neither weighted nor expanded due to the small number of interviews conducted. Results should be considered directional in nature.

b Presented values are a weighted average per site. Values can be multiplied by the number of sites then summed to obtain a program total.

c Presented value is a weighted average per vendor. Value can be multiplied by the number of vendors then summed to obtain a program total.

2.2 Direct benefits results

Any measures listed in the vendor reports as both recommended and implemented were accrued as evaluated direct benefits. For direct benefits, the program team's methodology included savings at participating sites, regardless of whether they were recorded in vendor reports. Because the evaluation team classified participating site savings as indirect if they were not included in vendor reports submitted to NYSERDA, the evaluated estimates for direct benefits are somewhat lower than program-reported values. Even if all participating site savings were reclassified as direct within the evaluation framework, realization rates would remain below 100%, though they would be marginally higher than currently reported. Interviews were conducted with building owners and managers participating in the RTEM program to verify the installation of recommended and implemented actions. In a limited number of cases, interviews revealed that some measures listed in the vendor reports as both recommended and implemented had not actually been implemented. These savings were deducted from the evaluated direct benefits totals. Additionally, these interviews helped identify measures that had been implemented but were not yet documented as such in vendor service reports. When this occurred, the savings from these implemented measures, if they were listed as recommended in vendor reports, were treated as direct benefits and included in the overall savings presented in this section. Some limitations to report comprehensiveness impacted the final results; please refer to Section 3.3.4, Direct benefits analysis method limitations, for review.

New York's Verified Gross Savings (VGS) guidance for studies conducted subsequent to the initial gross savings analysis[23] requires that evaluated savings be reported prospectively until it is replaced by a new VGSRR. The new VGS RR shall be applied prospectively beginning at the time the Gross Savings Analysis Report is filed. This requirement effectively limits the data that can be used for the current study to just the period occurring after the previous evaluation and only those projects considered 'complete'. As noted previously, the direct impacts evaluation period included in this study includes savings information between the period Q1 2022–Q2 2024.

- The evaluated savings estimates for this period include only the first year *measure* savings of projects completed and active within the current evaluation period.

[23] https://dps.ny.gov/system/files/documents/2022/11/ce-08-gross-savings-verification-guidance.pdf

- VGS guidance requires that lifetime savings for projects completed in prior evaluation periods cannot be *re-evaluated* (i.e., subsequent year savings from those projects are not included *again* here). In other words, there is no duplication of savings counts.
- The savings over time approach used for the RTEM program incorporates 'new' savings that occur within the current evaluation period. Annual savings build over time, assuming all installed projects remain in service.
- As noted above, the approach used in the current evaluation is consistent with the savings over time strategy developed in earlier evaluations. This method ensures that all savings incurred during the current evaluation period are captured for completed/acquired projects.
- Of the 345 sites from AI extraction, there are 31 new completed sites in the current evaluation analysis period.

As shown in Table 2-, the program achieved a 62% verified gross savings realization rate (VGSRR) for electric direct savings for the current evaluation period and a 66% VGSRR for gas direct savings for the same period. These VGSRR values should be applied for this evaluation period. Overall, from program inception, the program achieved a 48% VGSRR for electric direct savings and a 47% VGSRR for gas. Table 2- shows the VGSRR and evaluated savings as a percentage of baseline consumption with their associated confidence intervals for the current evaluation period, Q1 2022–Q2 2024. Note that the VGSRRs reported for the prior evaluation periods are consistent with prior reporting and were not modified by this evaluation's analysis.

Table 2-17. Summary of RTEM program verified direct impacts to the commercial, small to medium business, and industrial sectors[24]

Program period	Program-estimated electricity savings, gross annual (MWh)	Verified electricity savings, gross annual (MWh)	Electric VGSRR	Program-estimated natural gas savings, gross annual (MMBtu)	Verified natural gas savings, gross annual (MMBtu)	Natural gas VGSRR
Q1 2017–Q4 2020	157,959	50,547	32%	72,978	24,083	33%
Q4 2020–Q4 2021	56,383	34,394	61%	24,838	8,445	34%
Q1 2022–Q2 2024 (current evaluation)	**129,090**	**79,889**	**62%**	**72,463**	**47,717**	**66%**
Overall	343,432	164,829	48%	170,279	80,245	47%

[24] The verified gross annual savings will not match the evaluated installed direct savings for indirect because the indirect savings analysis considered all savings, whether acquired or not, while the direct savings analysis only considered acquired savings.

Table 2-18. Summary of Q1 2022–Q2 2024 RTEM program direct benefits VGSRR by fuel type to the commercial, small to medium business, and industrial sectors – weighted

Benefits	VGSRR	VGSRR 90% CI	Evaluated savings as a percentage of estimated consumption baseline (%)	Percentage of estimated consumption baseline 90% CI	Sample size (n)	Population size
Direct electric	62%	±30%	6.08%	±2.8%	38	102
Direct gas	66%	±57%	2.17%	±1.5%	38	102

Table 2- and Table 2- summarize the direct verified savings gross realization rates (VGSRRs) by size for Q1 2022–Q2 2024. Table 2- provides the program-estimated and verified gross annual energy savings overall, and by fuel type. Evaluated savings and realization rates are not available as a percentage of evaluated consumption—this data was not available for the population or the complete sample.

Table 2-19. Q1 2022–Q2 2024 direct benefits participant realization rates by size domain – electric – weighted

Domain	VGSRR	VGSRR 90% CI	Verified savings as a percentage of baseline energy consumption (%)	Percentage of estimated consumption baseline 90% CI	Sample size (n)	Site population size (N)
Small	79%	±34%	7.03%	±2.7%	24	66
Medium	109%	±104%	9.00%	±8.7%	9	25
Large	14%	±13%	1.82%	±1.7%	5	11
Overall	**62%**	**±30%**	**6.08%**	**±2.8%**	**38**	**102**

Table 2-20. Q1 2022–Q2 2024 direct benefits participant realization rates by strata – gas – weighted

Stratum	VGSRR	VGSRR 90% CI	Verified savings as a percentage of baseline energy consumption (%)	Percentage of estimated consumption baseline 90% CI	Sample size (n)	Site population size (N)
Small	104%	121%	2.61%	2.2%	24	66
Medium	0%	0%	0.00%	0.0%	9	25
Large	77%	68%	4.36%	4.5%	5	11
Overall	**66%**	**±57%**	**2.17%**	**±1.5%**	**38**	**102**

Table 2-21. Q1 2022–Q2 2024 reported and evaluated direct savings from participating buildings by strata – weighted[25]

Stratum	Estimated electric gross savings (MWh)	Verified electric gross savings (MWh)	Estimated natural gas gross savings (MMBtu)	Verified natural gas gross savings (MMBtu)
Small	48,580	38,268	28,256	29,296
Medium	43,403	47,084	23,360	0
Large	37,107	5,313	20,847	16,087
Overall	**129,090**	**79,889**	**72,463**	**47,717**

2.2.1 Comparison of VGSRRs to prior evaluations

The prior RTEM Program Impact Evaluation, published in September 2023, presented realization rates for evaluated sites that had been installed from Q4 2017 through Q4 2021. The prior study calculated two separate VGSRR for the program to account for the program's calculation update to claimed savings before and after Q4 2020. For the prior study, the same sample of sites was used in each estimation, with the method of program savings differing to simulate each period savings method across all sites. Table 2- outlines the first-year[26] early and late kWh and MMBtu verified gross savings realization rates from 2017 through Q4 2021.

Table 2-22. Prior RTEM program impact evaluation VGSRR

Installation dates: Year	Sample size	Q1 2017-Q4 2020 electric VGSRR	Q1 2017-Q4 2020 non-electric VGSRR	Q4 2020-Q4 2021 electric VGSRR	Q4 2020-Q4 2021 non-electric VGSRR
1	218	21%	14%	40%	15%
2	153	11%	17%	21%	17%
3	86	0%	2%	0%	2%
4	8				
5	1				
Total	N/A	32%	33%	61%	34%

Table 2- summarizes the VGSRR across the current and prior studies for electric and non-electric fuel types. In the prior studies, the evaluation contractor team excluded vendor reports with

[25] Note that verified savings by size will not sum to overall verified savings, and in some cases may be higher than the overall verified savings, since the estimated weighted VGSRR is being applied to population savings estimates, versus verified savings being estimated directly from the weighted sample.

[26] Years 1-5 in the table do not align with calendar years, rather, they represent the sum of first-year savings for each site and first-year savings for successive measures installed at each site.

incomplete information, such as missing savings values. This method may have introduced an upward bias in savings verification, because more complete reports were used and incomplete reports were dropped from the analysis. In the current evaluation, the evaluation contractor team sampled all reports, resolved missing or unreported savings through interviews and proxy estimates, and verified that measures assigned zero savings were accurate, rather than unknown.

Table 2-23. Summary of current and prior RTEM evaluated direct benefits VGSRR by fuel type to the commercial, small to medium business, and industrial sectors

Fuel type	Q1 2017-Q4 2020 VGSRR	Q4 2020-Q4 2021 VGSRR	Current study (Q1 2022-Q2 2024)
Electric	32%	61%	62%
Non-electric	33%	34%	66%

2.2.2 Realization rates by sector

The evaluation contractor team found that seven facility types are mostly represented in the sample and population that are available for domains analysis and reporting: colleges and universities, commercial offices, commercial retail, food and beverage, healthcare, K-12 schools, and not for profit. The remainder of the facility types representing fewer sites were grouped under "other." Table 2- shows the population spread across the four sector types and facility size. EM systems in commercial, retail, and institutional facilities reported a focus on building schedules and savings came primarily from HVAC settings and maintenance. EM systems in industrial and agricultural facilities were focused on industrial processes, with customers indicating a desire to reduce the price per unit of their products.

Table 2-24. Facility type distribution and weighted VGSRRs[27]

Evaluation assigned sector	Number of facilities in analysis sample	Number of facilities in population	Facility type percent within sample	Facility type percent within population	Electric VGSRR	Natural gas VGSRR
College/ University	5	11	13.2%	10.8%	12%	0%
Commercial Office	18	36	47.4%	35.3%	80%	22%
Commercial Retail	1	4	2.6%	3.9%	9%	0%
Food/Beverage	1	1	2.6%	1.0%	2%	0%
Healthcare	3	4	7.9%	3.9%	18%	1116%
K-12 Schools	8	41	21.1%	40.2%	0%	0%
Other [a]	2	5	5.2%	4.9%	26%	0%
Total	**38**	**102**	**100%**	**100%**	**62%**	**66%**

a The "Other" category includes the following facility types: chemicals, hospitality, manufacturing, government, not for profit, and miscellaneous other.

2.2.3 Realization rates by vendor type

The evaluation contractor team grouped the sites by vendor categories on the services and focus of projects completed by vendors for the RTEM program. These categories include software overlay only, automated system optimization (ASO) focus, fault detection and diagnostics (FDD) focus, both ASO and FDD focus, and vendors who develop building automation systems to customers which we are categorizing as OEM controls only vendors. Table 2- and Table 2-show the direct benefits realization rates by the different vendor classification categories.

The realization rates and percentage of baseline energy consumption for Software Overlay Only and ASO Reporting Focus Only vendor types are much higher than sites engaging with or using services provided by other vendor types. All vendor types implemented HVAC control measures more than other measures type. Among the different vendor types, ASO Reporting Focus Only vendors recommended a larger proportion of HVAC controls measures, which were observed to

[27] Please see Section 3.3.4, Direct benefits analysis method limitations, for additional information about sectors assigned a VGSRR of 0%.

lead to more energy savings (see Section 2.2.4.1, Vendor classification for HVAC control measures).

In particular, the sites that leveraged vendor services focused on FDD tended to focus on cost reductions that don't necessarily lead to energy use reductions. Earlier evaluations also indicated that the types of measures recommended and implemented by these vendor types did not sufficiently lead to implementation of capital projects, which has historically reduced assumed savings and realization rates (see Appendix H, Selected results from NYSERDA evaluations). This trend was observed in the current evaluation.

Table 2-25. Direct electric benefits participant realization rates by vendor type – weighted[28]

Domain	VGSRR	VGSRR 90% CI	Verified savings as a percent of baseline energy consumption (%)	Percentage of estimated consumption baseline 90% CI	Sample size (n)
Software Overlay Only	105%	±44%	10.21%	±4.0%	13
Software Overlay + Controls Install	5%	±4%	0.47%	±0.5%	15
ASO Reporting Focus Only	122%	±69%	12.62%	±7.1%	8
FDD Reporting Focus Only	0%	±0%	0.00%	±0.0%	9
ASO + FDD Reporting Focus	44%	±38%	4.33%	±3.3%	19
OEM Controls	0%	±0%	0.00%	±0.0%	8
Overall	**62%**	**±30%**	**6.08%**	**±2.8%**	**38**

A similar trend to the vendor offerings from direct electric benefit was found with direct gas benefits as well. Vendor's leveraging services focused on software overlay and ASO reporting achieved significantly larger realization rates compared to vendors only leveraging FDD and OEM controls.

[28] Please see Section 3.3.4, Direct benefits analysis method limitations, for additional information about vendor types assigned a VGSRR of 0%.

Table 2-26. Direct gas benefits participant realization rates by vendor type – weighted[29]

Domain	VGSRR	VGSRR 90% CI	Verified savings as a percent of baseline energy consumption (%)	Percentage of estimated consumption baseline 90% CI	Sample size (n)
Software Overlay Only	116%	±111%	4.13%	±2.5%	13
Software Overlay + Controls Install	0%	±0%	0.00%	±0.0%	15
ASO Reporting Focus Only	264%	±212%	5.47%	±3.0%	8
FDD Reporting Focus Only	0%	±0%	0.00%	±0.0%	9
ASO + FDD Reporting Focus	0%	±0%	0.00%	±0.0%	19
OEM Controls	0%	±0%	0.00%	±0.0%	8
Overall	**66%**	**±57%**	**2.17%**	**±1.5%**	**38**

2.2.4 Comparison of recommended measures to strategic focus areas

The evaluation contractor team reviewed both the AI-extracted and manual vendor report extracted recommendations to see how many align with the strategic focus areas per the New York TRM. The evaluation contractor team considered the following strategic focus area categories in this review:

- Agriculture equipment
- Agricultural equipment controls
- Building shell
- Compressed air
- DHW control
- HVAC
- HVAC control
- Other (including refrigeration and refrigeration controls)

Table 2- summarizes the quantity, direct electric savings, and direct gas savings for all recommended measures from the sample vendor reports that the evaluation contractor team reviewed using AI-extraction and manual methods. The measure data includes all vendor report data analyzed, which includes projects from the prior evaluation periods. Note that this table

[29] Please see Section 3.3.4, Direct benefits analysis method limitations, for additional information about vendor types assigned a VGSRR of 0%.

summarizes only the recommended savings for all reporting periods, and not the final verified implemented first year savings.

Table 2-27. Recommended measures from vendor reports by measure category

Measure category	Number of measures	Electric direct savings (MWh)	Gas direct savings (MMBtu)
HVAC control[a]	1,671	75,860	44,941
Other	292	4,856	302
Motors, pumps, VFDs	132	707	600,592
HVAC tune-up[a]	65	589	0
HVAC[a]	56	3,831	72,509
Demand response	53	78	0
Whole building monitoring	52	3,109	0
HW control (BMS) [a]	36	1,314	19
Elevator	27	37	0
Lighting control	17	315	0
Comfort, health, safety	16	0	0
Battery storage	13	8,800	0
Behavioral	9	0	0
Appliance (air cleaners)	7	0	0
HW equipment tune-up[a]	5	0	36
Lighting	4	865	12,001
Solar	3	1	0
Comprehensive energy audit	2	0	0
HVAC equipment tune-up	1	0	0
Building shell[a]	1	0	0
Overall	**2,462**	**100,362**	**730,400**

a Strategic focus area measure or related to a strategic focus measure

The evaluation contractor team reviewed the recommended measure quantities and energy savings. Key takeaways include:

- **HVAC controls.** Of the strategic focus areas, the HVAC controls measure category was recommended in the RTEM program the most, at 1,671 measures or 68% of all recommended measures. The most common measures in this category are temperature setpoint adjustments, occupancy-based controls, installing or calibrating sensors, and equipment runtime adjustments. HVAC controls represent 76% of the recommended electric savings, and 6% of the recommended gas savings.
- **HVAC.** Another strategic focus area shows promise with upgrades to HVAC equipment measures, with 4% of recommended electric savings and 10% of recommended gas

savings at only 2% of the recommended measure count. The most common measures in this category include chiller system upgrades, boiler system upgrades, and HVAC equipment upgrades.

- **Motors, pumps, VFDs.** A key finding regarding the recommended savings is that these measures resulted in significant negative savings of 3,130 MWh and positive savings of 3,837 MWh, leading to a net recommended savings of 707 MWh, or 1% of the total recommended electric savings. These measures, representing only 5% of the total recommended measures, contributed to a large increase in electric energy consumption but also resulted in significant gas energy savins of 600,592 MMBtu, accounting for 82% of the total recommended gas savings. These measures increase motor, pump, and VFD electric energy consumption to improve thermal space heating efficiency.
- **Battery storage.** Although battery storage is not a strategic focus area, this measure shows a large savings potential, with 9% of the total recommended electric savings from about 0.5% of the recommended measures.

Figure 2-2. Graph of recommended electric savings and measure count per measure category

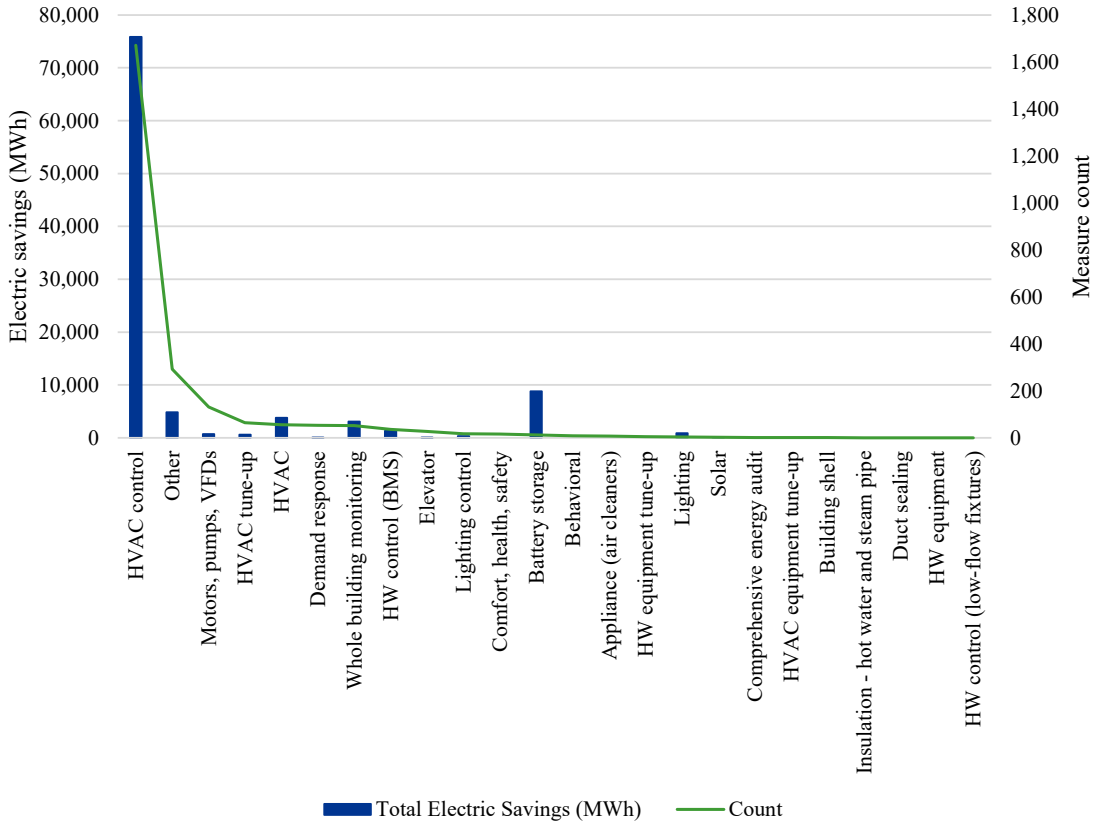
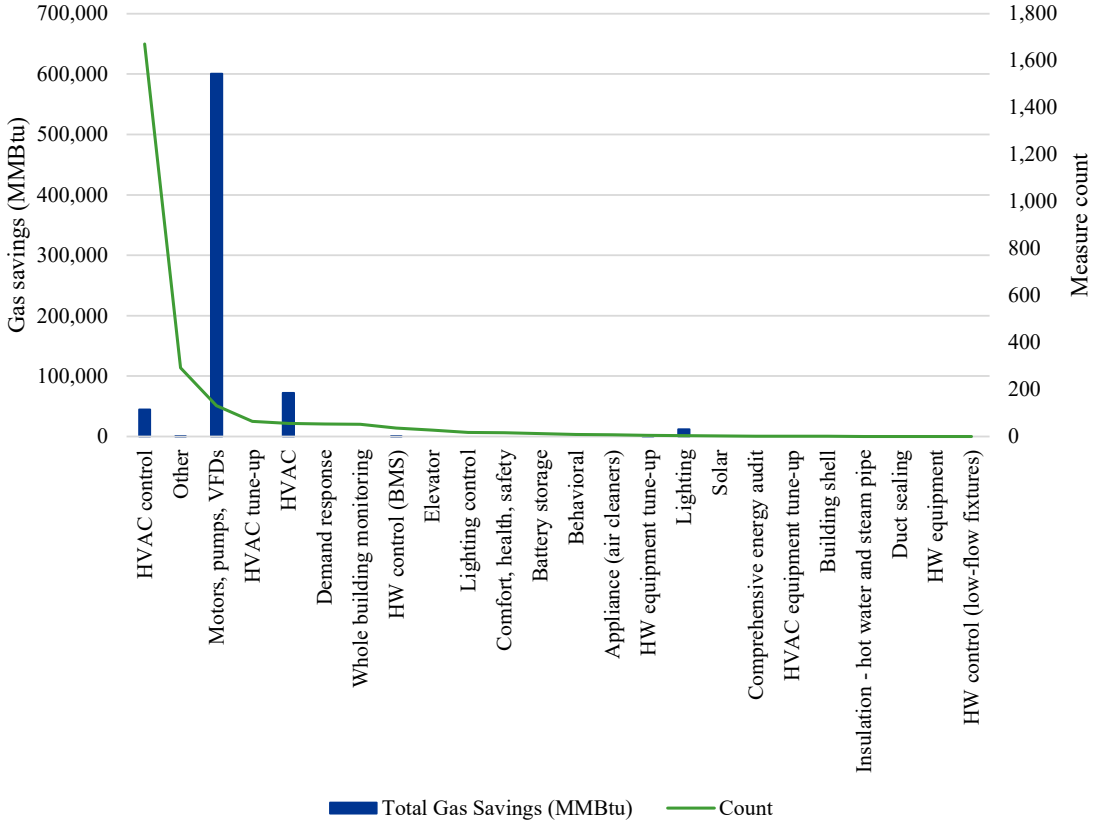


Figure 2-3. Graph of recommended gas savings and measure count per measure category



2.2.4.1 Vendor classification for HVAC control measures

The evaluation contractor team reviewed and assigned vendor classifications based on the primary services they provide to participants of the RTEM program. The primary vendor classification groups include a focus on fault detection and diagnostic (FDD) services, automated system optimization (ASO), or both. Table 2- provides a breakdown of vendor classification for HVAC controls projects and the recommended electric and gas savings. Vendors who focus on automatic system optimization (ASO) achieve the largest proportion of energy savings for the HVAC controls measures, with 85.1% of the direct electric savings and 52.7% of the direct gas heating savings, while only representing about 47.8% of the HVAC controls measures.

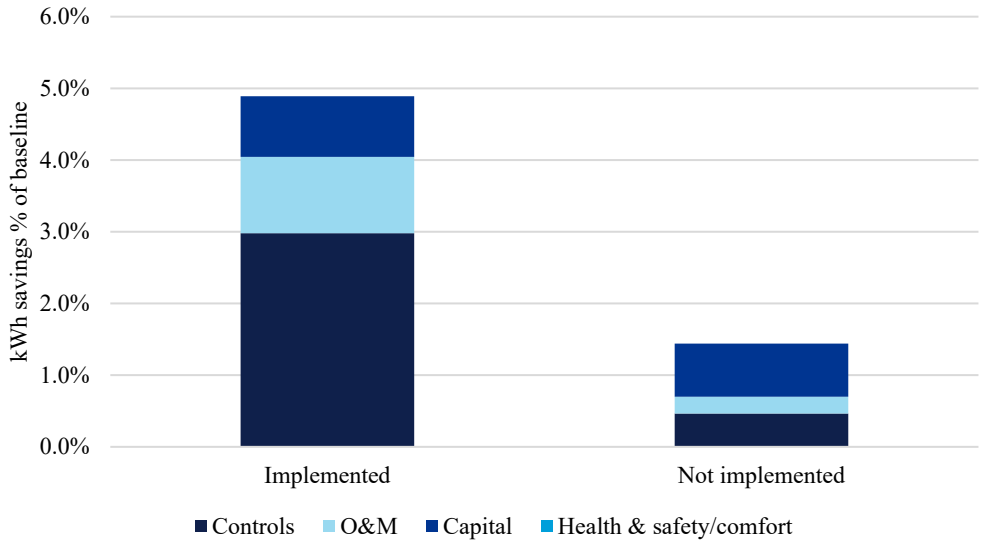
Table 2-28. Vendor characterization summary of recommended HVAC controls measures

Vendor classification	N	Electric direct savings (MWh)	Percent of electric direct savings (%)	Gas direct savings (MMBtu)	Percent of gas direct savings (%)
ASO	798	64,552	85.1%	23,670	52.7%
FDD	235	3,231	4.3%	2	0.0%
Both	638	8,077	10.6%	21,270	47.3%
Total	**1,671**	**75,860**	**100%**	**44,941**	**100%**

2.2.4.2 Implemented measure savings by measure type

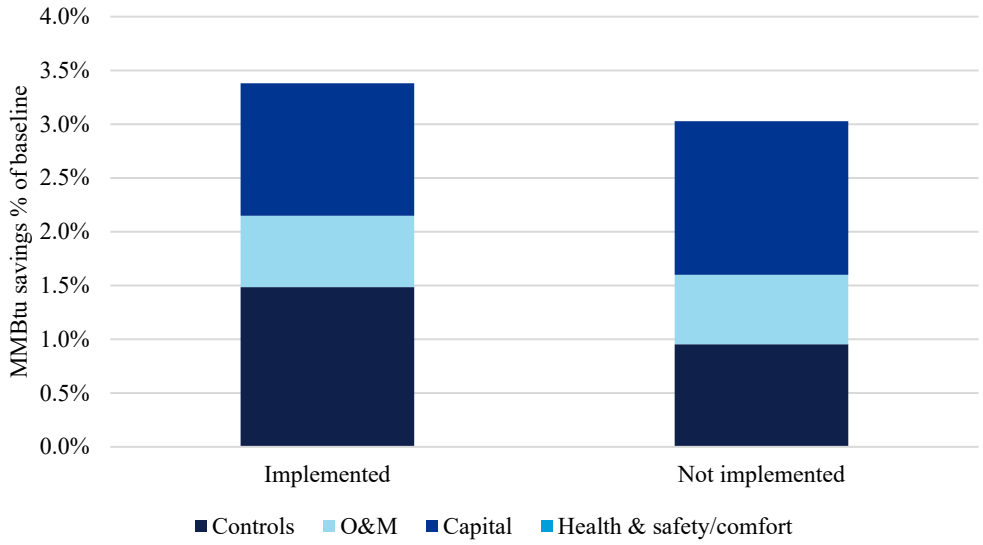
Finally, the evaluation contractor team examined the savings relative to baseline by measure type for the reviewed vendor reports and the prior evaluation sites. The measure categories were grouped into Controls, O&M, Capital, and Health & Safety/Comfort measure types. Figure 2- and Figure 2- compare implemented and not-implemented average first-year electric energy and average first-year gas energy savings relative to baseline consumption by measure type. These figures include measures for energy savings from measures that were committed and acquired with completion readiness dates provided. Additionally, they include installed and acquired savings across the current and prior evaluation sites. These savings values per measure are unweighted. The evaluation contractor team removed any outliers with greater than 100% savings relative to baseline for these comparisons.

Figure 2-4. Implemented and not implemented average first year electric savings by measure-type



The evaluation contractor team found that control measures, on average, achieved greater electric savings as a percentage of baseline consumption compared to implemented O&M and capital measures. O&M measures were likely understated, particularly for FDD measures where quick equipment corrections may not have easy savings quantification. Additionally, health and safety measures were recommended but did not always affect energy use. Implemented electric measures achieved average electric savings of 3.0% of baseline for control measures, 1.1% of O&M measures, and 0.8% for capital measures. Not-implemented electric measures had average electric savings of 0.5% of baseline for control measures, 0.2% for O&M measures, and 0.7% for capital measures. Not-implemented measures had lower savings as a percentage of baseline consumption for controls and O&M measures, while capital measures showed similar savings relative to baseline for both implemented and not-implemented.

Figure 2-5. Implemented and not implemented average first year gas savings by measure-type



The evaluation contractor team found that more gas control measures were not implemented compared to implemented, when compared to the implementation rates of electric controls measures. The not-implemented gas control measures with the largest savings percentages of baseline consumption typically involved boiler or steam plant operational changes, and adjustments to absorption chiller operation. Gas capital measures achieved greater savings on average relative to baseline consumption compared to electric capital measures. However, not-implemented capital gas measures are more frequent and represent greater energy savings compared to implemented gas capital measures. Implemented gas measures achieved average electric savings of 1.5% of baseline for control measures, 0.7% of O&M measures, and 1.2% for capital measures. Not-implemented measures had average electric savings of 1.0% of baseline for control measures, 0.6% for O&M measures, and 1.4% for capital measures.

Eight measures were categorized under Health & Safety/Comfort across gas and electric savings, with three measures implemented and five measures not implemented. However, none of these measures had reported electric or gas savings values. While these measures are being recommended, vendors are not currently attributing any energy savings to them or reporting them as implemented. This trend underscores the importance of continued tracking and evaluation to better understand their impact over time.

2.3 Findings and recommendations

2.3.1 Indirect benefits findings and recommendations

Finding 1: The two most significant indirect pathways of influence for the RTEM program are additional and unreported actions by participating organizations at participating buildings, which resulted in 30,694 MWh and 73,845 MMBtu of energy savings, and contributions from participating vendors at nonparticipating buildings, which generated 50,561 MWh and 20,865 MMBtu in savings.

Recommendation 1: Any future versions of the RTEM program, when considered, should support and strengthen these pathways to optimize indirect benefits that could be achieved over time.

NYSERDA Response to Recommendation: Pending. NYSERDA will assess the pathways revealed in this evaluation that apply to future programs that feature characteristics that can be replicated.

Finding 2: Unreported and additional actions from participating organizations at nonparticipating buildings resulted in 23,012 MWh and 22,317 MMBtu of indirect energy savings. Meanwhile, participating vendors at participating buildings contributed 6,434 MWh and 15,845 MMBtu of indirect energy savings. These pathways show somewhat less evidence of indirect benefits for the RTEM program.

Recommendation 2: Future versions of this program, when considered, should explore program interventions to help participating organizations scale RTEM to their portfolio of buildings. This is already occurring in a limited way, and there is room to optimize the pathway of influence.

NYSERDA Response to Recommendation: Implemented. NYSERDA is scaling these considerations for certain subsectors in the RTEM + tenant program.

Finding 3: Although there is evidence of the NYSERDA RTEM program influencing New York utilities' RTEM programs, it is too early to estimate indirect benefits from this influence pathway.

Recommendation 3: As utility RTEM programs scale over time, NYSERDA should revisit and estimate the indirect benefits associated with those projects, since NYSERDA did influence the design and launch of those programs.

NYSERDA Response to Recommendation: Pending. NYSERDA will revisit once utility programs have matured.

Finding 4: Interviews revealed that, on average, each vendor has over 10 RTEM projects that continue using RTEM services after NYSERDA engagement to support non-energy benefits (e.g., building occupant comfort).

Recommendation 4: NYSERDA should consider quantifying non-energy benefits in future versions of this program as part of the evaluation process.

NYSERDA Response to Recommendation: Pending. NYSERDA will be capturing non-energy benefits for future versions of this program.

2.3.2 Direct benefits findings and recommendations

The findings and recommendations for the current program evaluation are listed below. Selected results from prior evaluations have been included in Appendix H, Selected results from NYSERDA evaluations, to provide additional context for the current findings, in addition to a clearer view of the program evolution and resulting assumptions that affect direct benefits accounting more broadly.

Finding 1: From Q1 2022 through Q2 2024, the RTEM program achieved electric direct energy savings of 79,889 MWh (realization rate: 62%) and non-electric direct energy savings of 47,717 MMBtu (realization rate: 66%). Beyond these direct impacts, the program influenced owners and managers of participating buildings to take additional actions outside of vendor service reports, contributing to notable indirect energy savings. Estimating total savings for this program is challenging to quantify ex post, as effects from specific measures implemented through RTEM systems are often indistinguishable and may not be fully captured in available documentation.

Recommendation 1a: To better capture the full scope of program impacts, consider requiring vendors to report implemented savings, or establishing another systematic method for capturing

savings attributable to RTEM systems. Direct savings estimates from vendors who provided this information were higher than those from sites without such reporting, while indirect savings estimates often rely on customer-reported actions that can be affected by recall bias. More consistent documentation of implemented actions and associated savings would reduce underestimation risk and provide a clearer picture of the program's influence on operational practices and decision-making in the market.

NYSERDA Response to Recommendation: Pending. NYSERDA will revisit during future iterations of the program.

Recommendation 1b: Consider requesting, at program intake, key technical details for equipment monitored by the RTEM system – for example, manufacturer spec sheets, system capacity, square footage or space served, and other relevant characteristics (e.g., for HVAC units, whether they are connected to other systems). While some of this information has been collected during application submission, it has not been part of the program process to identify site-by-site specific savings. Having these details readily available would be valuable during future evaluations that follow a similar process, as it would help evaluators determine what actions customers took because of the RTEM system and better understand the magnitude of associated savings. Collecting this information at intake is generally more efficient and less burdensome than attempting to gather it retrospectively during evaluation.

NYSERDA Response to Recommendation: Pending. NYSERDA will consider this feature for future program iterations.

Finding 2: The RTEM program achieved savings in different sectors, showing the flexibility of the system to address complex situations. For forecasting purposes, it is important to understand differences in outcomes in terms of percent savings in different sectors. EM systems in commercial, retail, and institutional facilities reported a focus on building schedules and savings came primarily from HVAC settings and maintenance. Customer-reported goals for EM systems in these facilities were tenant comfort and energy savings. EM systems in industrial and agricultural facilities were focused on industrial processes, with customers indicating a desire to reduce the price per unit of their products. While reductions in cost per unit can come from reduced energy use, the facilities reported taking other actions that reduced cost without a reduction in energy use. While the sample size for industrial facilities was not large enough to say

definitively, the study found less savings as a percentage of consumption in industrial facilities than in other sectors.

Recommendation 2: Consider forecasting savings based on facility type with different expectations for savings as a percentage of consumption in sectors who use the EM system in different ways.

NYSERDA Response to Recommendation: Implemented. This is already a feature of program reporting where aligned with facility type and/or sector.

Finding 3: Electronic Data Interchange (EDI) data were successfully obtained for approximately 40% of sites. For the remaining sites, no usable data were returned from the EDI request. In addition, while the program collected some pre-installation consumption data, these data were only sufficient to support a sanity check for about 2% of sites, as the vast majority included just a single month of consumption. The lack of complete, standardized baseline data significantly limited opportunities to conduct a formal billing analysis to derive savings.

Recommendation 3: To support robust evaluation and long-term market insights, the program could consider requesting EDI data for all participating sites for each program year. If adopted, the program could extract account numbers and points of delivery (PoDs) from applications and submitted bills/proof of account upon program intake then immediately attempt to acquire baseline data to confirm the accuracy of the account numbers and PoDs in the tracking data. This will ensure data is available for savings estimation and evaluation. Note: there are some measures where billing data may be unable to provide direct quantification of savings, for example early identification of a system needing repair will often not have a period operating in poor condition to support billing or even advanced metering infrastructure–based estimation of savings because the increase in usage was avoided. Despite this risk, having more of the consumption data can enable better savings estimates even when used indirectly and can provide better baseline consumption estimates than the current square footage estimates provide. This, in turn, strengthens the program's ability to demonstrate its role in transforming market practices and decision-making over time.

NYSERDA Response to Recommendation: Pending. Some, but not all NYSERDA programs will have this feature moving forward.

Finding 4: Vendor service reports provide the best available information for measure installation and savings verification for the RTEM program and thus are the primary source for evaluation of direct savings. This is a key risk for the program, as vetting of the savings claims with engineering and baseline assessments was not possible. As described previously, customer reports suffer from recall bias, and billing data was largely unavailable or incomplete. The evaluation contractor team confirmed that vendor-reported implementations were completed and identified indirect benefits from participating sites, but where savings magnitudes were not reported, evaluator estimates of these savings may be lower than actual savings.

Recommendation 4: Continue to assess available methods for evaluation of the RTEM program. For instance, concurrent evaluation of targeted sites with large estimated savings and multi-site projects within two years of EM system installation would have a much higher likelihood of capturing measure-level post-installation information and participating organization intentions for future installations, associated savings data, and non-routine events from major equipment upgrades or industrial process improvements. Similarly, utility billing data would be more readily available through an EDI request. Customer and vendor interviews at this early stage would provide feedback to vendors on the critical importance of vendor service report data for evaluation of program direct benefits and capture more real-time indirect benefits as they are planned and occur.

NYSERDA Response to Recommendation: Implemented. NYSERDA is implementing pre-install interviews on select programs.

Finding 5: Vendor reports often included activities that might incur cost savings through diagnostics and fault detection events, but did not report any annual energy savings from such measures. NYSERDA assumes modeled energy savings for all fuels serving a site, so the presence of these activities can substantially depress realization rates and projected savings as a percentage of estimated baseline.

Recommendation 5: Consider including a post-installation verification step to confirm actual vendor-reported and installed energy-saving measures upon project completion or as part of the acquired savings process. This step will help verify actual baseline energy consumption and vendor-reported energy savings from installed measures. Post-installation verification will also

identify instances where only diagnostics or fault-detection activities were implemented, which result in cost savings for a site but not significant annual energy savings.

NYSERDA Response to Recommendation: Implemented. NYSERDA is implementing a post-installation verification on select programs.

3 Methods

Vendors provide service reports to program staff either quarterly, twice annually, or annually. These reports recommended operational improvements and capital projects that can achieve energy savings and other non-energy benefits, and, when feasible, also record the installation or execution of recommended actions.

Program methodology - direct benefits:

- All savings that occurred at participating sites were counted as direct benefits, regardless of whether they were documented in vendor service reports.

Evaluation methodology - direct benefits:

- Direct benefits were limited to energy savings measures at participating sites recommended by vendors and reported as implemented to NYSERDA through service reports.
- Measures were also counted as direct if interviews with customers or vendors confirmed installation of vendor-recommended actions, even if not documented as implemented in the reports.

Program methodology - indirect benefits:

- Indirect benefits were expected only from savings outside of participating sites, such as:
  - Energy savings projects at nonparticipating buildings within the portfolios of participating organizations that adopted RTEM systems.
  - Energy savings projects at nonparticipating buildings of nonparticipating organizations.

Evaluation methodology - indirect benefits:

- There were three potential sources of indirect benefits:
  - Energy savings projects at participating buildings if measures were installed that were not recommended in the vendor reports but still confirmed as implemented during interviews with customers or vendors.
  - Energy savings projects at nonparticipating buildings in participating organizations' building portfolio if organizations adopted an RTEM system at those sites.
  - Energy savings projects at nonparticipating buildings of nonparticipating organizations.

These distinctions mean evaluation estimates for indirect benefits are slightly higher than program estimates, while evaluation estimates for direct benefits are correspondingly lower. Even if the evaluated indirect savings that were not included in vendor reports at participating sites were reclassified as direct to align with the program methodology, the realization rates would remain below 100%, though they would be marginally higher than currently reported.

The evaluation contractor team also investigated NYSERDA RTEM program influence on the design of New York utility RTEM programs but found that it is too early to estimate indirect benefits from this influence pathway.

The evaluation contractor team interviewed various program and market actors to collect the information to verify the direct savings and market influence as well as indirect benefits of the program, in accordance with NYSERDA's Indirect Benefits Framework.[30] Table 3-1 details the approach for quantifying each of these streams.

Table 3-1. Indirect benefits framework and data collection methods by market actor

Market actor	Direct benefits	Indirect benefits	Data collection methods
Participating buildings (i.e., buildings that received program funding for the installation of eligible EM technology and are owned by participating organizations)	Direct involvement participant adoption: savings from NYSERDA-funded projects identified by program vendors *through vendor service reports*	Direct influence participant adoption: additional savings enabled by RTEM *but not reported in vendor service reports*	• Vendor round tables • Interviews with participating vendors and participating building owners/managers
Nonparticipating buildings (i.e., buildings that did not receive program funding for the installation of eligible EM technology but are owned by organizations that did receive incentives at other buildings)	N/A	Direct influence participant adoption: adoption of eligible EM technology (and resulting energy savings) at sites without program funding *but influenced by program participation*	• Vendor round tables • Interviews with participating vendors and participating building owners/managers
Nonparticipating buildings (i.e., buildings that did not	N/A	Nonparticipant adoption: adoption of eligible EM technology (and resulting	• Vendor round tables

[30] https://nysemail.sharepoint.com/sites/nyserda-ext/ExternalCollaboration/Contractors/RFQL4162/Resources/Guidance%20Documents/PM-Indirect%20Benefit%20Framework.pdf

Market actor	Direct benefits	Indirect benefits	Data collection methods
receive program funding for the installation of eligible EM technology and are not owned by organizations that received incentives at other buildings)		energy savings) at sites without program funding *but influenced by NYSERDA's market activities* (e.g., interactions with vendors and/or NYSERDA program staff and/or other utility program staff or training/marketing provided by the NYSERDA RTEM program)	• Data gathering from publicly available websites to identify projects from nonparticipating vendors and EM technologies • Interviews with participating vendors, nonparticipating vendors, NYSERDA program staff, and other utility program staff

Appendix B, Program logic model, provides the program logic model, summarizing program-intended outcomes associated with each market actor, with measurable indicators of realized direct and indirect benefits.

3.1 Sampling and data collection

This section describes the RTEM program projects, associated participant sites, and vendors in the sample frame for this study. The methods and sample design for indirect and direct benefits data collection are then detailed. Further details on the sample frame and sample designs are provided in Appendix A, Sampling memo.

3.1.1 Sample frame

Table 3-2 summarizes the application and vendor population in the RTEM sample frame with installation dates between January 1, 2017, through January 1, 2024, and completion dates through Q2 2024, excluding multifamily projects. The sample frame includes 654 sites across 327 project applications in the commercial, industrial, and small to medium business sectors. These projects were served by 57 unique vendors, receiving approximately $60 million in incentives from NYSERDA and impacting 223 million square feet. The sum of the distinct primary contractor names across sectors is greater than what is shown in the total rows, since several vendors provided service to multiple market sectors.

Table 3-2. RTEM population of application numbers and distinct vendors excluding multifamily projects

Market sector	Number of applications	Number of sites	Number of primary contractors	Total NYSERDA funding amount	Total impacted site square footage
Commercial	297	610	51	$52,044,909	190,130,921
Industrial	21	29	12	$7,312,029	32,152,253
Small to Medium Business	9	18	3	$1,175,528	367,528
Total	**327**	**654**	**57**	**$60,532,466**	**222,650,702**

3.1.2 Data collection activities

The evaluation contractor team conducted a variety of data collection activities to assess the direct and indirect impacts of the program. Data collection methods leaned on the insights of NYSERDA program managers, program participants, and participating and nonparticipating vendors to understand the program-related actions they have taken, and NYSERDA's influence on those actions. The evaluation's data collection methods were:

- **NYSERDA program staff interviews** to illuminate the causal relationship between NYSERDA program activities and indirect benefits by market actor.
- **Participating vendor service report review** to provide the primary source of direct impact savings verification information, as well as the indirect benefits at participant sites. The evaluation contractor team designed an AI-driven document extraction tool to retrieve information on measured energy savings, cost savings, vendor-recommended measure descriptions and savings information, and installation status. All AI data extraction was based on project data submitted to NYSERDA on or before May 14, 2025.
- **Participant building owner/manager interviews** to 1) confirm the installation and execution of energy saving actions reported in vendor reports (direct benefits), 2) inquire about additional actions installed or executed at participating sites that were not previously reported to the program (indirect benefits), and 3) confirm RTEM program influence in taking such actions.
- **Round table discussions with program-participating vendors** to establish causality mechanisms. The evaluation contractor team worked with NYSERDA program staff to invite three to four RTEM vendors to each of two round table discussions, targeting highly engaged vendors for one focus group, and less engaged vendors to the second focus group. The round table discussions sought to gather insight into the types of engagement with NYSERDA that lead to vendors selling RTEM-eligible systems and services more actively outside of the program. The round tables offer color to the legacy RTEM vendor interviews, which more systematically inquire about sales outside of the program and to what extent NYSERDA influenced the vendors to recommend RTEM-eligible systems and services more often to their customers.

- **Participating vendor interviews** to 1) find out about RTEM-eligible system/service sales to nonparticipating customers, 2) determine whether those nonparticipant sales received an incentive, and 3) decipher whether all or some of those non-incentivized sales were influenced by the program.
- **Nonparticipating vendor identification** to assess a larger automated controls market of which the RTEM-eligible systems are a subset, which was conducted through market characterization analysis. The evaluation contractor team first identified the firms selling into this space and charted the distribution of functionality within the market, including RTEM features to identify the population of EM providers that could qualify for RTEM. This identification was first attempted using publicly available web site data as secondary research. Due to a low number of vendors identified using this approach, the team compiled a list of 230 nonparticipating vendors. With this list, the team built a tool to collect and aggregate information from thousands of web search results to support NYSERDA being able to identify characteristics of nonparticipants that would make them suitable for program participation. To support identification of suitable nonparticipating vendors, this approach also included 92 RTEM-qualified vendors.
- **Nonparticipating vendor interviews** to assess whether the vendor is aware of the NYSERDA RTEM program, and if so, whether they were influenced in any way by the program activities to more often recommend RTEM-eligible systems.

Table 3-3 provides an overview of these activities, the period of program activity evaluated within the target group, and sampling methods for those groups, where relevant. Subsections describe the sample designs for indirect and direct data collection.

Table 3-3. Overview of data collection activities and sampling methods

Target group	Population	Sampling method	Stratification	Target	Complete	Target confidence/ precision
Program staff interviews		-	-	-	-	-
Indirect benefits						
Participating vendor round table discussions	57	Targeted	-	2 (3 – 4 vendors each)	2 (7 total vendors)	-
Participating vendor interviews	57	Stratified and targeted	Funding received	20	19	85/15
Nonparticipating vendor identification (AI data mining)	211 non-RTEM qualified vendors	-	-	-	-	-
Nonparticipating vendor interviews	321	Stratified	Company size (# employees)	8	6	-

Target group	Population	Sampling method	Stratifi-cation	Target	Complete	Target confidence/ precision
Participant interviews	327 across 654 sites	Stratified	-	15 sites	14 sites	85/15
Direct benefits						
Vendor service report engineering reviews	327 across 654 sites	Stratified	Funding received, Evaluation (Prior/ Current)	240 new sites, 109 prior sites	389 sites (345 AI, 44 manual), and 109 prior sites	90/10
Building consumption data					161	-
Participant building owner / manager interviews				23 sites	24 sites	-

3.1.2.1 Data collection outreach and response rates

The evaluation contractor team made a minimum of three outreach attempts to each vendor or participant to request an interview.[31] At least one of those outreach attempts was made by NYSERDA (either RTEM program staff or the evaluation PM). For large customers or vendors responsible for many sites, NYSERDA RTEM program staff also made at least one phone call outreach attempt. The primary data collection fielding occurred between March 24 and May 23, 2025. A $250 e-gift card incentive was offered to each vendor and customer to thank them for their time.[32] Table 3-4 and Table 3-5 provide response rates for each participant and nonparticipant data collection activity.

Table 3-4. Response rates for each participant data collection activity

Activity	Target sample	Number of contacts receiving outreach attempts	Completed interviews	Completed interviews as a percent of target sample	Response rate
Vendor round tables	6–8	9	7	100%	78%

[31] Interviews lasted, on average, approximately one hour.

[32] The evaluation contractor team received emails and/or heard during interviews from over one dozen interviewees that they appreciated this incentive amount and deemed it an adequate exchange for their time.

Activity	Target sample	Number of contacts receiving outreach attempts	Completed interviews	Completed interviews as a percent of target sample	Response rate
Participating vendor interviews	20	34	19 [a]	95%	56%
Participating customer interviews	38	117	38 [b]	100%	33%
Total	**64–66**	**160**	**64**	**96%**	**40%**

a One of the vendors interviewed only completed projects outside of this evaluation's scope (outside of the period being evaluated), so the final expansion included responses from 18 vendors to represent the population.

b The evaluation contractor team conducted interviews representing 38 project sites. However, some interviews gathered information on sites not in this evaluation's scope (not-yet acquired savings outside of the period being evaluated), and expansion took place at the application level, so the final indirect expansion included 30 applications to represent the population. The direct expansion further limited the scope of applicable projects, leaving 14 applications for that analysis.

Table 3-5. Response rates for nonparticipant vendor interviews

Activity	Target sample	Number of contacts receiving outreach attempts		Completed interviews	Completed interviews as a percent of target sample	Response rate
Nonparticipating vendor interviews	8	36		6	75%	17%
Total	**8**	**36**		**6**	**75%**	**17%**

Table 3-6, Table 3-7, and Table 3-8 provide a breakout of square footage coverage for participants based on the interview type. The sample was drawn based on a targeted number of respondents stratified by incentive payments (see Appendix A, Sampling memo, for additional information), and not square footage coverage. Therefore, results on square footage should be taken as a directional indicator of population coverage, and the distribution of square footage by stratum will appear uneven.

Table 3-6. Square footage coverage of indirect participant interviews by stratum

Stratum	Interviewed (sq ft)	Population (sq ft)	% of population
1	4,899,675.18	107,897,100.79	5%
2	15,178,875.45	58,438,157.41	26%
3	26,743,311.61	42,796,315.03	62%
4	13,899,347.76	13,899,347.76	100%
Total	**60,721,210.00**	**223,030,921.00**	**27%**

Table 3-7. Square footage coverage of direct participant interviews by stratum[33]

Stratum	Interviewed (sq ft)	Population(sq ft)	% of population
1	3,990,584.60	16,278,968.69	25%
2	1,000,728.20	8,816,853.54	11%
3	6,070,621.20	8,553,954.77	71%
Total	**11,061,934.00**	**33,649,777.00**	**33%**

Table 3-8. Square footage coverage of vendor interviews by stratum

Stratum	Interviewed (sq ft)	Population (sq ft)	% of population
1	22,025,530.00	82,986,213.00	27%
2	41,695,733.00	86,964,465.00	48%
3	36,591,910.00	53,080,243.00	69%
Total	**100,313,173.00**	**223,030,921.00**	**45%**

3.1.2.2 AI data extraction facts and figures

The NYSERDA-approved Artificial Intelligence (AI) tools[34] were used to extract data from vendor reports very efficiently. Although it takes time to develop the methodology and capabilities, the scale of the effort is explained by a few key figures.

For analysis of vendor reports:

- AI extracts over 30 pieces of information from each vendor report for a site with just one measure-level recommendation and more for additional recommendations
- AI extracts information from approximately 30 vendor reports per hour
- Vendor reports processed for this study: 1,129
- An additional 1,421 other files were scanned to verify if the file was a service report

The AI data extraction tool was developed to extract data from reports that describe a single site. This precludes it from analyzing multi-site projects. Of the 441 single-site projects, 40 did not have any reports, leaving 401 sites for the AI data extraction tool to analyze. Of the remaining,

[33] As noted above, only 14 participant interviews were in-scope for the direct-benefit adjustment analysis, limited to projects with savings acquired during or after Q1 2022; however, since the overall population of projects was also limited to that time period, square footage coverage for the relevant population was similar to that of the indirect interviews covering the full program time series.

[34] AI tool developed for NYSERDA received AI Governance approval in accordance with New York State policy "Acceptable Use of Artificial Intelligence Technologies" 3/11/25; https://its.ny.gov/system/files/documents/2025/05/nys-p24-001-acceptable-use-of-artificial-intelligence-technologies.pdf#:~:text=All%20use%20of%20AI%20must,Standards)%2C%20as%20well%20as%20the

processing errors occurred on 56 sites related to corrupt documents and output formatting issues. Overall, the AI extraction tool extracted usable data from 345 sites (86%).[35] In Section 3.3.1, Vendor report savings review, the evaluation contractor team describes how the accumulated data extracted with AI was used to identify the final set of sites used in the direct benefits analysis.

For analysis of web data gathering:

- Pages: 8,380 across 211 nonparticipating vendors
- Data extraction: 30 hours of computer runtime for 8,380 pages
- Vendor summary aggregation from data extraction: 8 hours of computer runtime

3.1.2.3 Indirect benefits vendor interview sample design

Table 3-9 shows the population and sample design drawn for indirect benefits vendor interviews. The evaluation contractor team used stratified ratio estimation to assign vendors to strata based on funding received and estimated expected precisions, assuming a confidence level of 85% and an error ratio of 0.5.[36] Three strata are defined, with stratum 1 representing the smallest vendors and stratum 3 representing the largest. The evaluation contractor team targeted complete interviews with all four of the largest vendors, representing 50% of the total incentives, with 5 out of the 11 vendors representing the next 25% of incentives, and with 11 out of the 42 vendors representing the final 25% of incentives.

Table 3-9. Indirect benefits vendor interview sample design

Stratum	Total NYSERDA funding amount	Vendor population	Target vendor sample	Completed interviews
1	$14,148,382	42	11	11
2	$15,269,424	11	5	6
3	$31,114,660	4	4	2
Total	**$60,532,466**	**57**	**20**	**19**

The evaluation contractor team initially targeted four vendors in stratum 3, but found that one of the four was actually a customer. As such, this customer was targeted in the participating

[35] The data used for AI data extraction was based on vendor service reports made available on or before May 14, 2025.

[36] Estimated precisions are based on the expectation that there will be some correlation between the incentives received by each vendor and the amount of indirect savings that can be attributed to that vendor.

customer outreach, and the evaluation contractor team completed one interview more than targeted within stratum 2.

3.1.2.4 Indirect benefits participant interview sample design

Table 3-10 shows the population and sample design drawn for indirect benefits participant interviews. As with the indirect benefits vendor sample, the evaluation contractor team used stratified ratio estimation to assign RTEM participant applications to strata based on funding received and to estimate expected precisions, assuming a confidence level of 85% and an error ratio of 0.5. While the goal of this sample and data collection was to identify customers for interviews, the closest proxy available for customer was the application project name. It is possible that a participating customer submitted multiple applications, so when an application was selected for interview, the evaluation contractor team reviewed the tracking data to identify additional applications that might be associated with the customer to include in the interview.

The participant interview sample design breaks the population into four strata, with stratum 1 representing the smallest applications and stratum 4 representing the largest. The evaluation contractor team attempted to complete interviews with customers responsible for the two largest applications, alone representing approximately 20% of the total incentives received. The remaining strata account for approximately 27% of the total incentive each, with targets of five interviews among the smallest applications in stratum 1, and four interviews among the medium and large applications in strata 2 and 3.

The evaluation contractor team initially aimed to conduct 15 interviews focused on indirect benefits. However, indirect benefits questions were also asked in interviews with participants selected from the direct benefits sample. As a result, to determine the total number of interviews that collected data on indirect benefits, both the completed indirect benefits interviews and the direct benefits participant interviews should be added together.

Table 3-10. Indirect benefits participant interview sample design

Stratum	Total NYSERDA funding amount	Population	Target sample	Completed interviews
1	$16,357,134	231	5	5
2	$16,268,681	66	4	4
3	$16,625,449	28	4	3

Stratum	Total NYSERDA funding amount	Population	Target sample	Completed interviews
4	$11,281,202	2	2	2
Total	**$60,532,466**	**327**	**15**	**14**

3.1.2.5 Indirect benefits nonparticipating vendor interview sample design

To define the nonparticipant sample, the evaluation contractor team mapped the list of identified nonparticipating vendors with company size information (number of employees) from Pitchbook. The nonparticipating vendor interview sample design breaks the population of 321 identified nonparticipating vendors into four strata, with stratum 0 representing unknown size (as not all vendors were found/able to be mapped in Pitchbook), stratum 1 representing the smallest companies, and stratum 3 representing the largest. The evaluation contractor team attempted to complete interviews with eight vendors: two vendors from each of the four strata.

Table 3-11. Nonparticipating vendor interview sample design

Stratum	Non-participating vendor population	Target vendor sample	Completed interviews
0	172	2	2
1	131	2	3
2	10	2	1
3	8	2	0
Total	**321**	**8**	**6**

3.1.2.6 Direct benefits sample design

Direct benefits to participant buildings are derived from program funding for the installation of eligible EM technology and are owned by participating organizations. Savings from NYSERDA-funded projects are provided in vendor service reports.

The sample design drawn for each of these data collection methods is shown in Table 3-12. The sample design used stratified ratio estimation to assign RTEM participating sites to strata based on savings and to estimate expected precisions, assuming a confidence level of 90% and an error

ratio of 1. Sites reviewed in prior evaluations were not reviewed in this evaluation, and thus did not have targets for interviews or savings review.

The evaluation contractor team initially aimed to conduct 23 interviews focused on direct benefits. However, direct benefits questions were also asked in interviews with participants selected from the indirect benefits sample. As a result, to determine the total number of interviews that collected data on direct benefits, both the completed direct benefits interviews and the indirect benefits participant interviews should be added together.

Table 3-12. Direct benefits participant sample design

Stratum	Total NYSERDA funding amount	Site population	Target interview sample	Completed interviews	Target savings review sample
No incentives	-	4	0	0	0
Prior evaluations	5,438,882	109	0	0	109 [a]
Small	14,365,969	393	3	6	140
Medium	18,657,585	101	10	8	70
Large	20,931,137	47	10	10	30
Total	**59,393,574**	**653**	**23**	**24**	**349**

a These sites will be included in the analysis with a weight of 1 (representing themselves) using the verified savings from previous evaluations. The sites were not reevaluated for this study.

The evaluation contractor team collected evidence of direct benefits through vendor service report engineering reviews and building consumption data (where available from utilities or program-provided data), targeting 240 site savings reviews across the 654 sites in the population. This evaluation leverages savings review results from 140 prior evaluation studies, but does not repeat those reviews. The targeted 23 participant interviews are a subset of savings review sample.

3.2 Indirect benefits analysis

Indirect benefits analysis is detailed in this section according to the defined market actors.

For each indirect benefits pathway, the evaluation contractor team prioritized primary data collection to gather evidence of indirect benefits and then estimate the indirect benefits magnitude. Proxy savings information from similar sites or calculations based on secondary sources was used where primary data was not available. The analysis then expanded site-level

impacts to the full participating population using post-stratification, as described in Section 3.4, Aggregate analysis.

Table 3-13. Indirect benefits savings magnitude data by market actor

Market actor	Indirect benefits	Sources of indirect savings magnitudes
Participating buildings (i.e., buildings that received program funding for the installation of eligible EM technology and are owned by participating organizations)	Direct influence participant adoption: additional savings enabled by RTEM *but not reported in vendor service reports*	• Participating building owner/manager- or vendor-provided data • Proxy savings data from similar participating owner/manager buildings, scaled to site size • Proxy measure savings estimations, scaled to site size
Nonparticipating buildings (i.e., buildings that did not receive program funding for the installation of eligible RTEM technology but are owned by organizations that did receive incentives at other buildings)	Direct influence participant adoption: adoption of eligible RTEM technology (and resulting energy savings) at sites without program funding *but influenced by program participation*	• Participating building owner/manager- or vendor-provided data • Proxy savings data from similar participating owner/manager buildings, scaled to site size • Proxy measure savings estimations, scaled to site size
Nonparticipating buildings (i.e., buildings that did not receive program funding for the installation of eligible RTEM technology and are not owned by organizations that received incentives at other buildings)	Nonparticipant adoption: adoption of eligible RTEM technology (and resulting energy savings) at sites without program funding *but influenced by NYSERDA's market activities* (e.g., interactions with vendors and/or NYSERDA program staff and/or other utility program staff or training/marketing provided by the NYSERDA RTEM program)	• Proxy savings data from similar participating vendor buildings, scaled to site size

3.2.1 Direct influence participant adoption

Direct influence participant adoption describes qualifying changes or upgrades (in participating and nonparticipating buildings) that are not claimed as direct benefits by the program. These changes or upgrades may be additional savings enabled by EM, or adoption of EM (and resulting energy savings projects) through a portfolio without program incentives.

To quantify **indirect savings at participating buildings from participating organizations**, participating building owners and managers for those buildings gave information on additional installed measures beyond what was recommended in vendor reports that were influenced by

RTEM program participation in the eventual action. The site-level indirect energy savings from participating buildings was calculated as:

Indirect savings at participating buildings from participating organizations:

$$\Delta E_{site} = \sum_{i}^{n} \Delta E_{meausure} \times I_{site}$$

Where:

$\Delta E_{meausure}$= unreported measure level savings, and
I_{site} = program influence factor given by the respondent

To quantify **indirect savings at participating buildings from participating vendors**, a very similar methodology was used.

Indirect savings at participating buildings from participating vendors:

$$\Delta E_{site} = \sum_{i}^{n} \Delta E_{meausure}$$

Where:

$\Delta E_{meausure}$= unreported measure level savings, and

Unreported measure savings are estimated using a mix of engineering methods informed by parameter assumptions based on the measure description, site end-use description, site area, baseline site consumption, and similar past measure savings factors. In many cases project specifics were vague, and reasonable assumptions had to be made. All assumptions and sources were documented. Where possible, the evaluation contractor team used engineering methods informed by the New York TRM. For those cases, the efficient measure properties were stipulated and baseline properties were informed by ASHRAE 90.1 by building type (i.e., lighting and effective cooling hours) or by federal minimum appliance efficiency standards. When the TRM was not used, the evaluation contractor team assumed percent savings factors based on secondary research and prior engineering experience with similar measures. The percent savings was applied to baseline consumption, sometimes in conjunction with other factors such as the proportion of an end-use to the whole building consumption (based on CBECS data) or the percent expected hours of operation.

To quantify **indirect benefits from nonparticipating buildings owned or managed by participating organizations,** building owners/managers and vendors were asked whether RTEM-eligible systems were installed at additional sites in their portfolio of buildings. The building owners/managers were asked to compare the non-program sites with program sites in terms of building size and project scale. The analysis then calculated a scaling factor to account for the building size and project scale difference between program and non-program RTEM sites. An influence factor is calculated as the sum of the program and vendor influence on the participant to scale to additional sites. Indirect savings is then calculated as program-level savings per site multiplied by the scaling factor and the influence factor, as follows:

Indirect savings from nonparticipating buildings owned or managed by participating organizations:

$$\Delta E_{additional\ sites} = \left(\frac{\Delta E_{participating\ site}}{\Delta N_{participating\ site}}\right) \times I_{additional\ site} \times S_{additional\ site}$$

Where:

$\Delta E_{participating\ site(s)}$= savings at participating sites within the same building portfolio
$\Delta N_{participating\ site}$= number of participating sites within the same building portfolio
I_{site} = program influence factor given by the respondent
S = scaling factor = additional building sq ft / participating building sq ft

3.2.2 Nonparticipant adoption

Nonparticipant adoption of EM (and resulting energy savings projects) occurs among building owners/managers with no direct support from the NYSERDA program. This group includes both nonparticipating customers of legacy RTEM providers and nonparticipating customers of nonparticipating EM providers.

Nonparticipating customers of participating vendors were expected to primarily adopt EM technology through vendor portfolio growth of similar buildings. Vendor interviews sought to identify site-specific indirect impacts of nonparticipating sites in order to follow a similar analysis methodology to direct participant adoption. However, interviews commonly yielded more general information from participating vendors, such as the approximate number or relative proportion of such sites and the relative magnitude of their savings or activities compared to those from participating sites. The evaluation contractor team used this information to develop scaling factors to estimate these indirect benefits relative to the direct benefits reported by participating

vendor sites. Indirect savings from nonparticipating customers of participating vendors was then calculated as follows:

$$Indirect\ savings\ from\ nonparticipating\ customers\ of\ participating\ vendors:$$

$$\Delta E_{nonparticipants} = Number\ of\ sites \times \Delta E_{vendor\ participants} \times I_{nonparticipants} \times S_{nonparticipants}$$

Where:

$\Delta E_{vendor\ participants}$= savings at participating sites within the vendor portfolio of customers
I_{site} = program influence factor given by the respondent
S = scaling factor = nonparticipating building sq ft / participating building sq ft

For indirect benefits accruing to **nonparticipating customers of nonparticipating vendors**, the evaluation contractor team sought to understand the extent to which RTEM-eligible systems were installed, the characteristics of buildings in which they were installed (such as square footage), and the influence of the RTEM program on those installations. However, respondents to the nonparticipating vendor survey did not identify any installations of RTEM-eligible systems at nonparticipating customer sites.

Nonparticipating vendors were identified through a market characterization analysis of data collected through publicly available web sites and using the AI tool to analyze the data for secondary research. The aim was to assess a larger automated controls market within which the RTEM-eligible systems are a subset. The evaluation contractor team first identified the firms selling into this space, and extracted all service offerings described, including RTEM features. The team mapped revenue to each of the identified firms from Pitchbook as a proxy for market share, providing an overview of the larger market and RTEM's place in that market. This market snapshot can be monitored to chart the increase in EM functionality over time. The evaluation contractor team also leveraged this list to identify the population of EM providers that could potentially qualify for RTEM.

To compile the data required, the evaluation contractor team attempted to use a set of search terms in collaboration with NYSERDA RTEM program staff to identify potential vendors who

are selling RTEM-eligible systems. However, the search results returned an inadequate number of vendors, so a list of vendors was acquired from NYSERDA (contractors that started an application or applied and were qualified to participate in the program but did not end up completing any projects) and LBNL (the vendor list compiled during the Smart Energy Analytics Campaign, which has since ended).

The evaluation contractor team then used the vendor list and the agreed-upon search terms to develop a data gathering tool to fetch search results and the data from the linked pages for relevant content. This data was used to identify organizations that potentially are selling RTEM-eligible systems and other automated control systems in New York. The data gathering technique extracted relevant information about the characteristics of organizations, products and/or services. The AI part of the algorithm processed the data to find the organizations that are selling RTEM-eligible products. The list of organizations was provided to NYSERDA program staff to determine if they have or have not participated in the RTEM program.

After collecting the information on participants and nonparticipants, the evaluation contractor team built a tool to allow NYSERDA to utilize characteristics that indicate if the nonparticipating provider has the necessary business to become a participating service provider.

3.2.3 Indirect benefits analysis method limitations

The indirect benefits approach relies on vendor-provided information, which presents multiple limitations to the resolution of the analysis and sources of potential bias:

- In large part, vendors provided service to multiple sites across the program and were unlikely to recall measure-level detail of site-specific information, or even the site-specific activity within and outside of the RTEM program. Further, multi-year delays between EM system installation and vendor interviews reduced the likelihood that vendors can provide details of installation outcomes.
- Due to the vendor recall limitation, the magnitude of indirect savings resulting from nonparticipating sites is unclear. The evaluation contractor team used a scaling factor between the relative size of participating and nonparticipating sites to estimate the savings magnitude, which has a large potential for error, as activities at individual sites may be much more variable than this estimation predicts. The risk is mitigated for portfolios of buildings for which the vendor has frequent interactions and/or detailed vendor reports; these categories of vendors were seen to carry through operational measure execution fairly consistently across the portfolio.

3.3 Direct benefits analysis

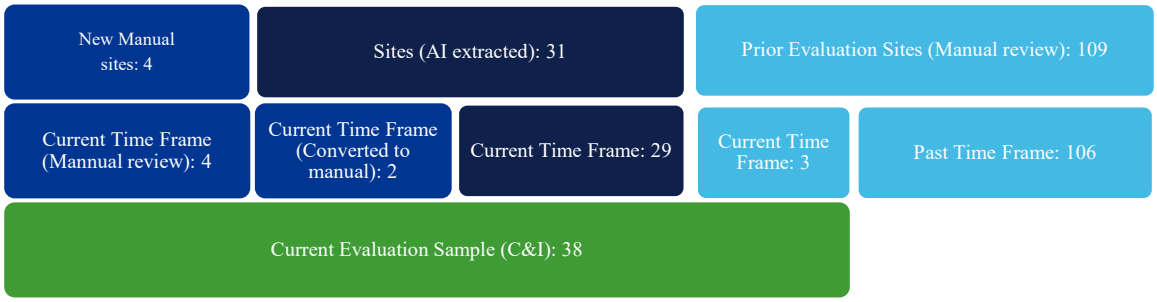
This section details the direct benefits analysis for service report savings review, billing analysis, participant interviews, and expansion analysis. The evaluation contractor team received project files supporting 389 sites, consumption data for a subset of 161 sites, and completed participant interviews for a further subset of 38 sites. The baseline and post-installation energy usage, as well as the energy savings, were verified for both electric and gas usage for all evaluated sites, as detailed in this section.

3.3.1 Vendor report savings review

The AI tool described in Section 463.1.2.2, AI data extraction facts and figures, extracted data from 345 sites with vendor service reports, and the team manually reviewed an additional 44 sites' service reports, totaling 389 sites for this evaluation initially. Additionally, the team leveraged vendor-extracted information from 109 sites from the prior evaluation.

Of the 345 sites from AI extraction, 298 were dropped from the analysis due to sites with completion dates outside of the current evaluation period, sites with unacquired program savings, prior evaluation sites, and sites where savings could not be verified from vendor reports. Additionally, 16 were multifamily buildings, which are out of scope for this evaluation, leaving 31 sites for analysis from the current evaluation from AI extraction. The evaluation contractor team manually reviewed a subset of two of the 31 sites from the AI extraction tool, where the IDIs provided additional information about installed measures, leaving 29 sites reviewed exclusively using the AI extraction tool. With the remaining 29 sites from AI extraction, a total of six manually reviewed sites, and 109 sites from the prior evaluation, the evaluation contractor included savings estimations for 144 sites in the RTEM program. Of the 144 total sites included in the analysis, 38 sites are within the current evaluation period: 35 new sites and three prior evaluation sites with completion dates within the current evaluation period. Of the 35 new sites reviewed in the current evaluation, 23 of these are from the sample, 11 sites are from the backup stratum, and one site is from the "no incentives" stratum. Figure 3-1 summarizes the site counts and sources for the final count used in the analysis.

Figure 3-1. Summary of site counts for savings review



Of the 345 sites from AI extraction, 293 were dropped from the analysis due to sites with completion dates outside of the current evaluation period, sites with unacquired program savings, and sites where savings could not be verified from vendor reports. Additionally, five were from the prior evaluation and 16 were multifamily buildings, which are out of scope for this evaluation, leaving 31 sites for analysis from the current evaluation. The evaluation contractor team manually reviewed a subset of two of the 31 sites from the AI extraction tool, where the IDIs provided additional information about installed measures, leaving 29 sites reviewed exclusively using the AI extraction tool. With the remaining 29 sites from AI extraction, a total of six manually reviewed sites, and 109 sites from the prior evaluation, the evaluation contractor included savings estimations for 144 sites in the RTEM program. Of the 144 total sites included in the analysis, 38 sites are within the current evaluation period: 35 new sites and three prior evaluation sites with completion dates within the current evaluation period. Of the 35 new sites reviewed in the current evaluation, 23 of these are from the sample, 11 sites are from the backup stratum, and one site is from the "no incentives" stratum.

The AI tool was used to extract vendor information from all available service reports. The goal of this review was to understand the scope of the projects and to extract information pertaining to the energy savings resulting from the RTEM system observations. Vendor reports were pre-screened using an AI model to extract energy savings and manually reviewed to confirm the accuracy of the extraction. Savings from these sites expanded to the population as part of the aggregate analysis.

The evaluation contractor developed an AI data extraction application that automatically extracts unstructured data from participating vendor service reports and outputs them in a structured format for downstream analysis. The data extraction application takes PDFs that were converted to plain text and prompt engineering of a large language model (LLM) to produce structured

output data. The output data was subsequently validated manually against the previous RTEM study and against the source documents. Section 3.1.2.2, AI data extraction facts and figures, describes how much of the data extraction and collation effort was accomplished by the AI tool. A key part of the work was to develop an output containing metadata on the data extraction process so that it was easier to validate the outputs. This was accomplished by getting the LLM to validate its own work implementing heuristic measures of data quality and by manual review. Approximately 90% of all the data extracted is pulled correctly. Where data is inaccurate, we typically see that the report has an unusual reporting format or uses atypical language to refer to site and measure level savings.

The extracted information from vendor service reports included, where available:

- Site-level energy savings
- Recommended measure description and type (capital, controls, and O&M)
- Measure installation status and installation date
- Energy and cost savings resulting from the measure (electric, gas, oil, or steam)
- Facility and vendor type

This information was collected for all service reports within a project. Service reports predominantly cover a period of six months, with a few exceptions covering quarters. The number of service reports provided depends on how long the RTEM system has been installed. The evaluation contractor team encountered one to ten service reports per site, covering three to five years of service.

Service reports varied in their level of detail; many reports provide detailed measure-level descriptions and savings, while others lack this detail. Similarly, several vendors, constituting over 50% of the sites in the population, provide service reports that are less quantitative and more qualitative than the other vendors. The evaluation contractor team reviewed report data to determine where reports provide inconclusive savings estimations, and established decision-making criteria for inclusion of vendor reports in the verified savings estimation. These criteria are:

- To eliminate duplicate savings estimations, where site-level and measure-level savings were reported, an engineering review determined whether overlap between those savings values was incurred and sorted between measure- and savings-level estimates.
- If zero savings were reported for some, but not all measures, those zero savings values were included in the verified savings analysis.

- If there was evidence that some or all of the measures were installed, but no savings information was reported, savings values were imputed from an estimated of savings from similar sites based on a proportion of energy use.
- Sites were dropped from the analysis where no quantified savings information (or zero savings values) was reported and installation is not understood. Participant and vendor interviews confirmed these savings values, where possible:
    - If the vendor report has no savings and this is confirmed with the interview, then it is a zero, not dropped.
    - If the vendor report has no savings and this cannot be confirmed with the interview, then it is dropped.

To determine the first-year savings for a site, the evaluation contractor calculated a cumulative first year of service for all installed measures, where a site-specific service year is the 12-month increment period that follows the installation date. The cumulative first-year savings includes the first year of service for any installed measure. For example, if a project installs two measures in its first year in the program, and a third measure in its second year, then the cumulative first-year savings is the Year 1 savings for the first two measures, and Year 2 savings for the third measure. Savings for the first two measures may have continued in Year 2, but these savings would not be counted as first-year savings for those two measures.

After savings extraction from vendor reports, the evaluation contractor team interviewed customers to verify that the actions listed in the vendor reports occurred as described. The results from these surveys informed the direct savings in-service ratio as described in the aggregate analysis.

3.3.2 Building consumption data review

Using EDI requests to obtain customer consumption data is considered best practice, as utility-provided data are regarded as the most accurate and reliable source of truth. For this evaluation, EDI requests were made to ensure access to the most complete and authoritative information available. The team attempted an EDI request for 594 accounts: 79 gas and 509 electric. Of those, 51 gas accounts and 449 electric accounts successfully passed through NYSERDA's prEDI code (used to clean information prior to requesting consumption data). Ultimately, the evaluation contractor team collected building electric consumption data for 185 EDI keys (170 sites) with installation dates available from the program's M&V process and where data were provided by customer utilities. The team reviewed the data and performed a quality check for completeness and usability. Upon review, 175 EDIs included post data in any year of the past five years. Pre-

install data, primarily acquired from the NYSERDA program team, is discussed further in Section 3.4.1, Site baseline energy consumption.

The evaluation contractor team completed an annual consumption analysis of post-installation data for the available site data. This annualized consumption was then compared to service report savings, with the purpose of completing review-based estimates of first-year annual savings. The annualized consumption data was then used to verify the reasonability of baseline energy use and savings estimation data for 40% of program sites with post-installation EDI data and in the current evaluation timeframe.

For this analysis, for each site within the sample population, the evaluation contractor team modeled the utility data as a function of weather data (cooling and heating degree days), and, if applicable, the post-COVID period, to establish the relationship between utility consumption and outdoor temperature. Once the relationship between the site's energy use and outside temperature was established using actual weather data, these regressions were then used to calculate expected annual use by applying recent (2007–2021) TMYx weather data from WeatherHub to the models.

The utility dataset contains a small subset of data that is estimated, rather than meter readings. These estimations demonstrate equal differences between months of data, averaging energy use across months when a meter was not read. A small subset of these estimations were dropped from the analysis when there are consecutive estimated records. For example, if a site has actual readings in January and March, and an estimated reading in February, that February record is retained.

3.3.3 Participating building owner/manager interviews

Interviews with participating building owners and operators were conducted for 38 sites. These interviews provided verification of installed measures and established whether additional energy savings projects at participating buildings were enabled by the program and not reported in the vendor reports. Some limitations to report comprehensiveness impacted the final results; please refer to Section 3.3.4, Direct benefits analysis method limitations, for review.

To quantify **additional non-reported savings from participating buildings**, participating building owners/managers or vendors for those buildings gave information on additional installed measures (recommended in vendor reports but not reported as installed) and RTEM program

influence in the eventual action. Similarly to savings estimations for indirect benefits from unreported measures described in Section 3.2.1, Direct influence participant adoption, savings information for these additional measures was taken, in order of priority, from the following sources:

- Estimated savings for recommended measures provided in vendor reports
- Participating building owner/manager-provided data
- Proxy savings data from similar measures at similar buildings, scaled to site size
- NY TRM savings calculation methods
- Secondary research to determine savings estimations, using CBECs where applicable to determine the proportion of baseline building energy use that is applicable to the installed measure end-use

The site-level direct energy savings from participating buildings was calculated as:

$$Direct\ savings\ from\ participating\ buildings: \Delta E_{site} = \sum_{i}^{n} \Delta E_{meausure} \times I_{site}$$

Where:

$\Delta E_{meausure}$= unreported measure level savings, and
I_{site} = program influence factor given by the respondent

3.3.4 Direct benefits analysis method limitations

The chosen program design and related tracking mechanism (aka typology) had the effect of limiting available direct benefits evaluation options that meet industry standards for energy use verification. In addition, current VGS guidance requires that all savings be reported prospectively, which effectively creates a gap between evaluation period and associated program actions with the applied VGSRR period. The savings over time approach used for RTEM ensures that all savings occurring within the evaluation period are included, which partly mitigates the limitations imposed by VGS guidance requirements, but does not alleviate the mismatch between evaluation period and VGS reporting period.

The evaluation contractor team mitigated limitations posed by the program design through use of an AI extraction method that enabled a broad collection of this service report information across sites, with greater resolution than a pre-/post- billing analysis method would have permitted, since it involves a deeper review of site-specific documents. This results in categorizing measures and

identifying how the savings are distributed within those measure type. On the other hand, the method also presents limitations and potential biases, which are described below.

- The evaluation contractor team was able to independently verify that savings occurred, but detailed verification of the savings calculations was not possible as various inputs, from trend data to equipment specific information, were missing since this was not a feature of the program design.
- The program approach relies on vendor-provided information, which presents multiple sources of potential bias:
    - Vendor reports varied in the level of detail provided. Vendors who reported measure-level savings to NYSERDA generally supplied more complete information than those who did not, which in turn allowed for more specific follow-up in customer and vendor interviews. In cases where detailed measure information was not available, interview questions had to be more open-ended, and customers often could not recall specifics for individual sites. This lack of uniformity in vendor reporting often carried through to unevenness in the data collected from participating customers. While this variation can introduce a potential bias in the results, the direction of that bias is not clear—incomplete reporting does not necessarily mean fewer savings occurred, only that they could not be confirmed as direct savings in this study. To address this, savings associated with actions lacking sufficient detail for direct attribution were categorized as qualitative indirect benefits.
    - In some instances, vendors did not report savings. Due to the inconsistency in reporting across vendors, this could be because: 1) the vendor did not provide an estimate of the savings that did occur from reported actions or 2) because no savings occurred from reported actions. For example, vendor reports often included activities that might incur cost savings through diagnostics and fault detection events, but did not report any annual energy savings from such measures. Additionally, in certain sectors and/or types of vendors (e.g., K-12 schools and vendors falling under the OEM controls domain) where most participation came from a small number of vendors with incomplete reporting, the resulting VGSRR were adversely affected and, in some cases, resulted in 0% evaluated savings. The decision criteria for review of these cases (defined in Section 3.3.1, Vendor report savings review) seeks to identify which of these outcomes is indicated by the report, capture zero savings values where they occurred, and drop sites with inconclusive resulting savings. In large part, the sorting of inconclusive reporting assumes these cases to have no direct savings, with incurred benefits instead captured through customer interviews. This approach helps ensure that unverified actions are still reflected in the overall assessment, but the variation in reporting detail and reliance on customer recollection of actions taken years earlier introduces potential bias. The direction of this bias is uncertain – incomplete reporting does not necessarily mean fewer savings occurred, nor does more detailed reporting necessarily mean greater savings.
    - In some instances, vendors stopped providing reports to NYSERDA. In that event, the status of the relationship between the vendor and customer is unknown, and thus

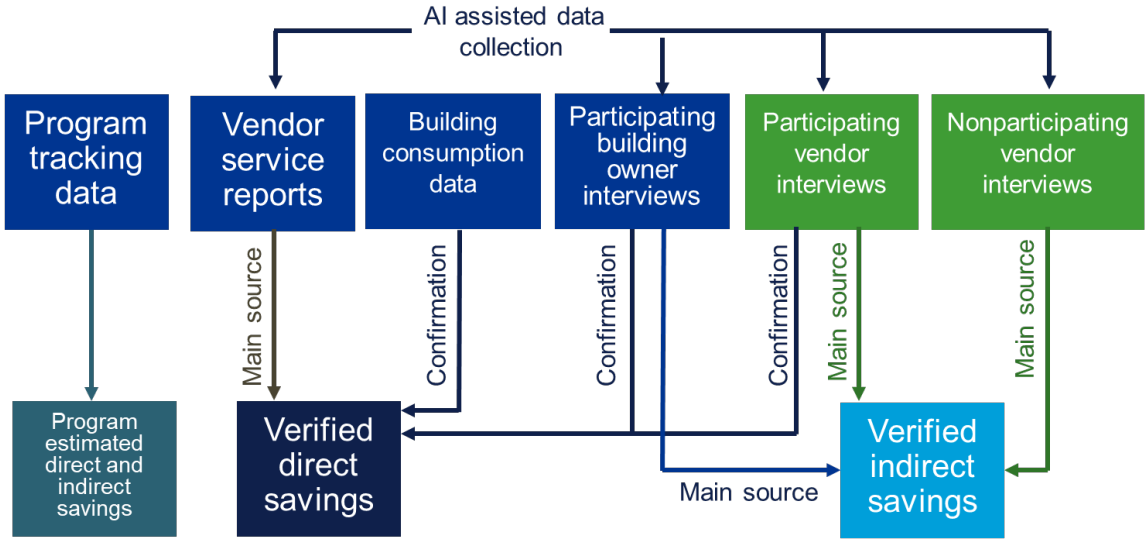
neither the long-term effect of the measures nor future recommendations and installations can be captured by evaluation. Since the assessment of the savings in this analysis is cumulative first-year savings, the implicit bias is that for some sites we may know direct savings from early years only and may underestimate cumulative first-year direct savings for measures installed in later years. The evaluation mitigated this bias by working through interviews to capture direct savings from the years since the last report. See Section 3.1.2, Data collection activities, for additional information about interviews.

- Non-routine events and COVID-19 occupancy change effects are not always easy to see or control for when looking at a service report. Few service reports addressed the issue, while the majority do not mention the matter altogether. As a result, savings from an occupancy or reset measure, for example, can be greater than what is typically expected because of increased vacancies in commercial office spaces. In the early COVID years, this may have a bias for overestimation of savings, while later COVID and post-COVID years may have a bias for underestimating savings. COVID may also affect the persistence of operational changes to buildings such as set points and schedules. As commercial spaces fill up, schedules may shift to longer hours in reaction to the comfort of tenants.

3.4 Aggregate analysis

The aggregate analysis expands post-installation energy usage and energy savings for the evaluated direct (site-level) samples and indirect (site- and vendor-level) samples to the sample frame. Figure 3-2 depicts these data flows, showing the connectivity of each primary data source with the indirect and direct benefits they inform. The verified savings estimates are then compared to program-estimated direct and indirect savings through a set of factors, defined herein, and those factors are expanded to the program population to verify program performance.

Figure 3-2. Data sources and flows for direct and indirect benefits analysis



3.4.1 Site baseline energy consumption

Site baseline energy consumption was taken from the prior evaluation program-reported baseline energy use when available for current evaluation sites. For sites without this data, the evaluation contractor team requested program-reported baseline data for projects completed in 2020 to the present. This evaluation considered only sites with acquired savings. The program determined baseline energy consumption for sites with acquired savings either using actual energy consumption, or estimated consumption based on energy intensity factors from CBECs by facility. Additionally, the evaluation contractors reviewed any provided baseline consumption data and utility bills from the project files. Approximately 72% of the site baseline consumption data provided in project files was unusable, consisting primarily of PDFs of utility bills for only 1 or 2 months. Ultimately, only 2% of sites had sufficient baseline consumption data provided by the program. A sanity check was completed, where possible, using the utility bills provided.

3.4.2 Savings extrapolation

To extrapolate the sampled participating sites to the sample frame, the evaluation contractor team assigned each of the 242 sites described in Section 3.3.1, Vendor report savings review, a sample weight based on their customer segment and size. The quarterly savings report dataset is considered as the reference in the size weighting. For this evaluation's sample design and analysis, C&I sites were originally assigned to size strata using stratified ratio estimation based on the amount of funding received from NYSERDA:

- **Small:** sites that received between $1,300 and $108,000 from NYSERDA
- **Medium:** sites that received between $108,000 and $300,000 from NYSERDA
- **Large:** sites that received between $300,000 and $904,000 from NYSERDA

The evaluation contractor team also included a fourth stratum containing all previously evaluated sites and not defined by size in the sample. These sites were not reevaluated and so enter the analysis with their existing result. They receive a weight of 1 in the analysis to represent themselves but not the remaining unevaluated population.

In addition to the original size stratification, sites were broken into additional "single-site" and "multi-site" application categories. This additional post-stratification was based on the discussion in the AI data extraction methods section that the AI tool could not extract information from multi-site applications. Instead, the evaluation contractor team used information collected during IDIs, along with manual engineering review, to evaluate these additional sites. Based on the described segmentation, the weight is the ratio of the number of sites within a particular category in the sample to the number of sites in the same category in the population. Table 3-14 shows the weight calculations.

Table 3-14. Weight calculation

Stratum	Size	Number of sites in sample	Number of sites in population	Weight
Previously evaluated sites	N/A	109	109	1.000
Sites included in single-site applications	Small	56	91	1.625
	Medium	26	44	1.692
	Large	5	6	1.200
Sites included in multi-site applications	Small	37	195	5.270
	Medium	4	17	4.250
	Large	3	11	3.667

Subsequently, the weight of each site was applied to both the evaluated acquired savings and the program-level savings within the sample. The realization rate was then calculated as the ratio of the weighted evaluated savings to the weighted program savings (see Section 3.4.2.2, Direct benefits expansion: verified gross savings realization rate calculations). The evaluated program-level savings were obtained by applying the realization rates for each fuel type to the program savings as reported in CEF quarterly reports.

3.4.2.1 Program claimed savings calculations

The claimed savings calculations changed over the course of the program. Therefore, to appropriately assess the performance of the program, the evaluation contractor team calculated an "early" and a "late" realization rate that should be applied to the appropriate set of program participants for informational purposes and to verify program savings as reported in CEF quarterly reports used for the realization rate that will be applied for the current evaluation period (Q1 2022–Q2 2024). The early realization rate applies to participants that joined the program prior to Q4 of 2020 and the late realization rate applies to participants that joined after Q4 of 2020. Table 3-15 describes the two methodologies the program adopted to calculate claimed savings.

Table 3-15. Program claimed direct savings calculations

Prior to Q4 2020	After Q4 2020
Program-reported direct MWh savings	
• Multifamily: 0.1548*Baseline Energy Use • Commercial < 25,000 sq.ft: 0.096*Baseline Energy Use • Commercial > 25,000 sq.ft: 0.159 *Baseline Energy Use	• Multifamily: 0.087*Baseline Energy Use • C&I: 0.082*Baseline Energy Use
Program-reported MMBtu savings	
• Multifamily: 0.1548*Baseline Energy Use • Commercial < 25,000 sq.ft: 0.096*Baseline Energy Use • Commercial > 25,000 sq.ft: 0.159 *Baseline Energy Use • Natural Gas to Oil split: MF 70/30, 100/0 Commercial	Program Reported MMBtu Savings - NG: • Multifamily: 0.138*Baseline Energy Use • C&I: 0.047*Baseline Energy Use Program Reported MMBtu Savings - #2 Fuel Oil: • Multifamily: 0.138*Baseline Gallon Oil Use*0.141 • C&I: 0.047*Baseline Gallon Oil Use*0.141

The program modified the energy savings factors applied and eliminated the size segmentation previously used. The program also now claims oil savings for non-multifamily projects, which was not the case previously.

To calculate indirect savings, the program multiplied each calendar year's gross electric and non-electric savings by an assumed 8% indirect rate.

3.4.2.2 Direct benefits expansion: verified gross savings realization rate calculations

The direct benefits achieved sample was expanded as two VGSRR ratios based on:

- All vendor service reports from which savings could be extracted
- All participating building interviews that could speak to direct savings

Once the evaluation contractor team calculated direct savings for each of the sites within the sample, they then quantified the overall VGSRRs by fuel type and overall. The facility size (using incentive payment as a proxy), along with whether a site was part of a single- or multi-site application, was embedded in the weights assigned to sites of different sizes within a particular facility type. The VGSRR calculation is as follows.

$$VGSRR_{Initial} = \frac{\sum_{j=1}^{S} W_j * V_j}{\sum_{j=1}^{S} W_j * T_j}$$

$$IDI\ Adjustment = \frac{\sum_{j=1}^{S} W_j * I_j}{\sum_{j=1}^{S} W_j * V_j}$$

$$VGSRR_{Final} = VGSRR_{Initial} \times IDI\ Adjustment$$

Where:

T_j	=	Tracking estimate of gross savings for site j
V_j	=	Verified gross savings for site j
I_j	=	IDI verified gross savings for site j
W_j	=	Sample weight for site j
S	=	Number of sites in the sample

The overall IDI adjustment factor for multifamily buildings was estimated to be 0.99 for electric savings and 1.00 for gas savings, with relative precisions of 1% and 0% respectively. These overall adjustments were applied to the overall VGSRR results and all domain results prior to reporting and are reflected in the results tables.

The final results presented in this report for Q1 2022 – Q2 2024 are based on a domains analysis of that time period from among the full sample of sites reviewed for this analysis.

3.4.2.3 Direct benefits expansion: rolling sample estimates

This report presents direct benefit realization rate estimates for the RTEM program since its inception, in addition to the current-evaluation-period specific realization rates. This was based on a weighted average of the realization rates from the current and prior evaluations and estimated as follows.

$$VGSRR_{a,b,c} = \frac{S_a VGSRR_a + S_b VGSRR_b + S_c VGSRR_c}{S_{a,b,c}}$$

Where:

S_a	=	Tracked savings estimate for Q1 2017 – Q4 2020
S_b	=	Tracked savings estimate for Q1 2021 – Q4 2021
S_c	=	Tracked savings estimate for Q1 2022 – Q2 2024
$S_{a,b,c}$	=	Overall tracked savings estimate for Q1 2017 – Q2 2024

Relative precision and confidence intervals were estimated for this rolling estimate as follows:

$$RP_{a,b,c} = \frac{\sqrt{(S_a RP_a)^2 + (S_b RP_b)^2 + (S_c RP_c)^2}}{S_{a,b,c}}$$

Where:

S_a	=	Tracked savings estimate for Q1 2017 – Q4 2020
S_b	=	Tracked savings estimate for Q1 2021 – Q4 2021
S_c	=	Tracked savings estimate for Q1 2022 – Q2 2024
$S_{a,b,c}$	=	Overall tracked savings estimate for Q1 2017 – Q2 2024

Variance estimation

The evaluation contractor team performed variance estimation on the results using Taylor Series Linearization through SAS's PROC SURVEYMEANS.

Method limitations

The evaluation was limited by the following factor:

- **Non-random sample response:** While the primary sites to be included in this analysis were based on a random sample, several sites were excluded for missing information or because the AI process was unable to extract information from certain project types (e.g., multi-site projects), requiring a different review procedure. This may result in biased population estimates.

3.4.2.4 Indirect benefits expansion: savings ratio calculation

The indirect benefits achieved samples from participating building owners/managers and vendors expand as separate ratios based on reported savings.

The building owner/manager level indirect savings ratio from participating buildings was then calculated using the equation below. The indirect savings from additional unreported actions at participating sites was calculated using the methodology described in Section 3.2.1, Direct influence participant adoption. Since the methodology to capture savings was based on measure level assumptions, rather than a percent of baseline consumption, indirect savings were compared to evaluated savings (tracked savings multiplied by gross realization rate).

$$Building\ owner\ participating\ building = \frac{\sum_{j=1}^{S} W_j * PI_j}{\sum_{j=1}^{S} W_j * (T_j * VGSRR)}$$

Where:

T_j	=	Reported gross savings for site j
PI_j	=	Indirect savings unreported additional actions at participating site j
W_j	=	Sample weight for site j
S	=	Number of sites in the sample

The building owner/manager level indirect savings ratio from nonparticipating buildings was then calculated using the equation below. The indirect savings from nonparticipating sites were calculated using the methodology outlined in Section 3.2.1, Direct influence participant adoption. Since the indirect savings from nonparticipating sites was proportional to the reported savings, it was compared directly to the reported savings.

$$Building\ owner\ nonparticipating\ building = \frac{\sum_{j=1}^{S} W_j * NPI_j}{\sum_{j=1}^{S} W_j * T_j}$$

Where:

T_j	=	Reported gross savings for site j
NPI_j	=	Indirect savings from nonparticipating sites related to site j
W_j	=	Sample weight for site j
S	=	Number of sites in the sample

The nonparticipating organization (vendor) level indirect savings ratio from participating buildings was then calculated using the equation below. The indirect savings from additional unreported actions at participating sites were calculated using the methodology described in Section 3.2.1, Direct influence participant adoption. Since the methodology to capture savings was based on measure level assumptions, rather than a percent of baseline consumption, indirect savings were compared to evaluated savings (tracked savings multiplied by gross realization rate).

$$Nonparticipating\ organization\ participating\ building = \frac{\sum_{v=1}^{S} W_v * PI_v}{\sum_{v=1}^{S} W_v * (T_v * VGSRR)}$$

Where:

T_j = Reported gross savings for projects related to vendor v
PI_j = Indirect savings unreported actions at participating site related to vendor v
W_j = Sample weight for vendor v
S = Number of vendors in the sample

The vendor-level indirect savings ratio from nonparticipating buildings was then calculated using the equation below. The indirect savings from nonparticipating sites were calculated using the methodology outlined in Section 3.2.1, Direct influence participant adoption. Since the indirect savings from nonparticipating sites were proportional to the reported savings it was compared directly to the reported savings.

$$Nonparticipating\ organization\ nonparticipating\ building = \frac{\sum_{v=1}^{S} W_v * NPI_v}{\sum_{v=1}^{S} W_v * T_v}$$

Where:

T_j = Reported gross savings for projects related to vendor v
NPI_j = Indirect savings from nonparticipating sites related to vendor v
W_j = Sample weight for vendor v
S = Number of sites in the sample

Appendix A Sampling memo

Memo to:
Dana Nilsson, NYSERDA

Copied to:
Kora Dreffs, DNV
Maura Nippert, DNV
Mimi Goldberg, DNV

From: DNV, Markets & Risk
Date: 4/10/2025
Prep. By: Nathan Caron, DNV

NYSERDA Energy Management Technology (EMT) – Real Time Energy Management (RTEM) evaluation, non-multifamily dataset of record, vendor sample, indirect benefits sample, and direct benefits sample

The work plan for the NYSERDA EM technology evaluation, dated November 26, 2024, requires DNV to review program participant and vendor information to develop sample frames and sample designs with the goal of estimating program direct and indirect benefits with sufficient confidence and precision. This memo describes the program vendor and participant project data received from NYSERDA and proposes sample designs able to meet the workplan targets of:

- Approximately 20 interviews with legacy RTEM participating vendors with the goal of estimating associated indirect benefits with 15% precision at 85% confidence. This assumes an error ratio (ER) for indirect benefits of approximately .5.
- Approximately 15 interviews with legacy RTEM participating customers with the goal of estimating associated indirect benefits. The workplan did not specify a precision or confidence goal for these interviews, but a sample of this size should allow for results with 20% precision at 85% confidence. This assumes an ER for indirect benefits of approximately .5.
- Approximately 240 legacy RTEM participating site reviews to estimate direct benefits with 10% precision at 90% confidence, assuming an ER of approximately 1, along with 23 in-depth interviews covering specific sites.
    - These project reviews and IDIs will be allocated across at least three size strata based on a stratified ratio estimation model.

- The sample frame will include RTEM sites not in the prior evaluation sample frame, along with sites that were in the prior frame but that could not be evaluated due to insufficient data at the time.
- The work plan includes the option of including previously evaluated sites in the direct benefit analysis. NYSERDA has elected not to pursue the option of reevaluating these sites; however, they will be included in the analysis with a unit weight (representing only themselves) using their results from previous evaluation.

Project and vendor dataset

DNV received the file "RTEM Top Sites and Vendors" from NYSERDA, dated November 2024, to serve as the base sample frame for this study, including all sites eligible for evaluation. This dataset contains details for 549 project applications and 1,019 sites with installation dates ranging from January 1, 2017, through January 1, 2024.[37] These projects were served by 67 unique vendors, receiving approximately $75 million in incentives from NYSERDA and impacting 284 million square feet. Excluding multifamily projects, since the sample design described in this memo will only target vendors that served non-multifamily projects, the population of unique applications is reduced to 327, with $60 million in incentives paid and 223 million square feet impacted. On average, the non-multifamily projects captured in the data are three times larger than the multifamily project. Table A-1 and Table A-2 show summaries of the application and vendor population including and excluding multifamily projects. Note that the sum of the distinct primary contractor names across sectors is greater than what is show in the total rows, since several vendors provided service to multiple market sectors.

Table A-1. EMT population of application numbers and distinct vendors including multifamily projects

Market sector	Number of applications	Number of sites	Number of primary contractors	Total NYSERDA funding amount	Total impacted site square footage
Commercial	297	610	51	52,044,909	190,130,921
High-Rise Multifamily (4 stories or more)	176	237	21	9,400,324	41,586,470
Industrial	21	29	12	7,312,029	32,152,253
LMI Multifamily	41	114	8	5,222,123	19,403,177

[37] The sum of "number of sites" in the application-level sample frame was 1,022, but during data cleaning we identified that while application "247749" claimed 4 sites at the application level, both the site-level Salesforce and Quarterly CEF extracts only indicate the application covering a single site, so the "number of sites" value for this application was reduced from 4 to 1.

Market sector	Number of applications	Number of sites	Number of primary contractors	Total NYSERDA funding amount	Total impacted site square footage
(Low-Moderate income)					
Low-Rise Multifamily (3 stories or less)	5	14	3	166,568	638,341
Small to Medium Business	9	18	3	1,175,528	367,528
Total	549	1,019	67	75,321,481	284,278,690

Table A-2. EMT population of application numbers and distinct vendors excluding multifamily projects

Market sector	Number of applications	Number of sites	Number of primary contractors	Total NYSERDA funding amount	Total impacted site square footage
Commercial	297	610	51	52,044,909	190,130,921
Industrial	21	29	12	7,312,029	32,152,253
Small to Medium Business	9	18	3	1,175,528	367,528
Total	327	654	57	60,532,466	222,650,702

Sample designs

Indirect benefits vendor interview sample

To select the indirect benefits vendor sample, we used stratified ratio estimation to assign vendors to strata based on funding received and to estimate expected precisions. We base this on the expectation that there will be some correlation between the incentives received by each vendor and the amount of indirect savings that can be attributed to that vendor. To estimate precisions, we assume a confidence level of 85% and an error ratio of .5, as was stated in the workplan. Table A-3 shows the proposed sample design. For this sample, we broke the vendor population into three strata, with stratum 1 representing the smallest vendors and stratum 3 representing the largest. We will attempt to complete interviews with all four of the largest vendors, representing 50% of the total incentives, with 5 out of the 11 vendors representing the next 25% of incentives, and with 11 out of the 42 vendors representing the final 25% of incentives.

Given the funding received by the top four vendors, it will be critical to complete interviews with all of them. Depending on response rates, we will likely have to contact each of the remaining vendors to achieve the target number of responses within stratum 1 and stratum 2.

Table A-3. Proposed indirect benefits vendor sample design

Stratum	Total NYSERDA funding amount	Vendor population	Target vendor sample	Estimated precision at 85% confidence
1	14,148,382	42	11	19%
2	15,269,424	11	5	25%
3	31,114,660	4	4	0%
Total	60,532,466	57	20	8%

Indirect benefits customer interview sample

As with the indirect benefits vendor sample, we used stratified ratio estimation to assign legacy RTEM participant applications to strata based on funding received and to estimate expected precisions, assuming a confidence level of 85% and an error ratio of .5. While the goal of this sample and data collection is to identify customers for interviews, the closest proxy for available for customer is the application project name. It is possible that a participating customer submitted multiple applications, so when an application is selected for interview the evaluation contractor team will review the tracking data to identify additional applications that might be associated with the customer that should be included in the interview.

For this sample, we broke the vendor population into four strata, with stratum 1 representing the smallest applications and stratum 4 representing the largest. We will attempt to complete interviews with customers responsible for the two largest applications, alone representing approximately 20% of the total incentives received. The remaining strata account for approximately 27% of the total incentive each, with targets of five interviews among the smallest applications in stratum 1, and four interviews among the medium and large applications in strata 2 and 3. Table A-4 shows the proposed design.

Table A-4. Proposed indirect benefits customer sample design

Stratum	Total NYSERDA funding amount	Population	Target sample	Estimated precision at 85% confidence
1	16,357,134	231	5	38%
2	16,268,681	66	4	43%
3	16,625,449	28	4	42%
4	11,281,202	2	2	0%
Total	60,532,466	327	15	19%

Direct benefits site review and IDI sample

For the direct benefits site review and IDI sample design, we used stratified ratio estimation to assign legacy RTEM participating sites to strata based on incentives received and to estimate expected precisions, assuming a confidence level of 90% and an error ratio of 1.

The sample frame for direct benefits is based on the application-level project and vendor dataset described earlier in this memo, but expanded to the site level, since the evaluation of direct benefits will be specific to each participating building. NYSERDA has requested that DNV not reevaluate sites already reviewed in prior studies; these were flagged based on projects marked "complete" in these prior evaluation result datasets and included as a "prior evaluation" stratum in the sample design, with no assigned target completes for reevaluation. They will be included in the analysis with a unit weight using the results from previous evaluations.

Table A-5 shows the proposed direct benefits sample design. Of the 23 sites targeted for IDIs, three will be assigned to the small sites in stratum 1, ten assigned to the medium sites in stratum 2, and ten assigned to the large sites in stratum 3. Of the 240 sites targeted for savings review/evaluation, 140 will be assigned to stratum 1, 70 will be assigned to stratum 2, and 30 will be assigned to stratum 3.

Table A-5. Proposed direct benefits customer sample design

Stratum	Total NYSERDA Funding Amount	Site Population	Target IDI Sample	Target Savings Review Sample	Estimated Precision at 90% confidence
No Incentives	0	4	0	0	0
Prior Evaluations	5,438,882	109	0	109	0%
Small	14,365,969	393	3	140	11%
Medium	18,657,585	101	10	70	10%
Large	20,931,137	47	10	30	19%
Total	**59,393,574**	**653**	**23**	**349**	**8%**

Appendix B Program logic model

The program logic model herein was defined by the Energy Management Technology – RTEM program to summarize program-intended outcomes associated with each market actor, with measurable indicators of realized direct and indirect benefits.

Table B-1. Program logic model

Market actor		Outputs/ outcomes	Indicators	Benefits category
Building owner/manager, (current or former RTEM vendor customer)	Increased awareness of using EM to support capital project planning	Percent of building owners/managers aware/knowledgeable of RTEM long-term capital project planning Percent of owners/managers participating in NYSERDA training courses	Indirect/direct	
	Increased use of EM	Percent of owners/managers implementing optimal start/stop Percent of owners implementing fault detection and diagnostics (FDD)	Indirect/direct	
	Customer confidence in EM results	Percent (or number) of implemented measures installed after NYSERDA engagement	Indirect	
	Increased use of EM for non-energy benefits	Percent of tenants including RTEM/EM stipulations within lease requests Percent reduction in tenant hot/cold calls Percent of owners/managers implementing occupancy-based management	Indirect	
RTEM Participant/Vendor	Variables affecting persistence of RTEM service contracts	Percent RTEM service contracts at least 5 years in duration	Indirect/direct	
	Percent of RTEM projects that use services for non-energy benefits (e.g., long-term asset management, capital investment strategies, risk mitigation analyses)	Number of RTEM projects that use services for non-energy benefits after NYSERDA engagement	Indirect	
		Number of RTEM projects that use services for non-energy benefits during NYSERDA engagement	Direct	

Market actor		Outputs/ outcomes	Indicators	Benefits category
	Utilization of RTEM data sets to advance efforts at demand reduction & peak load shaving	Percent of vendors implementing demand reduction and peak load shaving for replication sites and other projects within the vendor portfolio	Indirect/direct	
		Percent of vendors implementing demand reduction and peak load shaving within RTEM sites/projects		
	Demonstrated energy savings/O&M benefits from RTEM activities	Ratio of efficiency control measures (ECM) identified: ECMs implemented in addition to those recommended during NYSERDA engagement	Indirect/direct	
RTEM Participant/Vendor	RTEM providers identify & act on energy efficiency opportunities	Number/type of additional energy efficiency opportunities identified by RTEM providers (current and former)	Indirect	
	Variables affecting persistence of RTEM service contracts	Percent RTEM service contracts at least 5 years in duration	Indirect/direct	
	Demonstrated energy savings/O&M benefits from RTEM activities	Ratio of efficiency control measures (ECM) identified: ECMs implemented in addition to those recommended during NYSERDA engagement	Indirect/direct	
RTEM participating vendors and building sites	Verified gross energy impacts	kWh, MMBtu	Direct	
	Verified gross savings realization rate (VGSRR)	Ratio (%)		
	Verified savings as a percent of baseline energy consumption	Ratio (%)		
	Savings per incentive and/or program participant unit of measure	Ratio (%)		
Nonparticipating EM provider	Awareness and use of EM technology, and RTEM program	Percent of providers aware of RTEM program resources, programmatic criteria, and standards by providers	Indirect	
		Number of EM providers		
		Percent of offerings with RTEM		

Appendix C Participating vendor round table guide

Memo to: Dana Nilsson, Cody Glavey-Weiss, and Michael Reed; NYSERDA
CC: Maura Nippert; DNV
From: Kora Dreffs, Mersiha McClaren, and Mimi Goldberg; DNV
Date: 3/17/2025

NYSERDA RTEM: Vendor round table discussion guide

Discussion overview

Objective: The primary objective of the vendor round tables is to gather insight into what types of engagement with NYSERDA lead to vendors selling program-eligible EM systems and services more actively outside of the program. The round tables shall also offer color to the legacy RTEM vendor interview findings that are designed to more systematically inquire about sales outside of the program and to what extent NYSERDA influenced the vendors to recommend program-eligible systems and services more often to their customers. Finally, these conversations will test the assumption of whether highly engaged vendors are the best pathway for achieving program indirect benefits.

Anticipated timing (round table discussion length): 1 hour

Method of data collection: Microsoft Teams Meeting

Table 1 Research Objectives Mapped to Questions in This Instrument

Research Objectives	Interview Questions Address the Objectives
Get information to inform the design of the one-on-one vendor IDI guide	11
Obtain general information to inform quantitative indirect benefits assessment	9, 10
Obtain background on vendor involvement and engagement with the program	1, 4, 5, 6
Learn what vendors liked and disliked about the program	2, 2
Obtain general information on the impact of NYSERDA/vendor engagement on RTEM sales outside of the program	7, 8

Email invitation letter to the discussion

Hi [NAME],

NYSERDA has contracted DNV to evaluate the Real Time Energy Management (RTEM) program. Our program records show that your organization participated as a vendor through the program – thank you!

DNV would like to speak to you, and other vendors like you, about your experiences with the program and any influence on your offerings. This information will help NYSERDA determine what technology to continue to offer incentives for. We would like to speak with an employee at your organization who is knowledgeable about the RTEM program and customer sales.

We expect the round table discussion to take approximately one hour. To thank you for your time, we will send you a $250 e-gift card following completion of the conversation.

Please let us know all times when the appropriate contact from your organization is available for a recorded group conversation. The discussion will only be recorded to aid in notetaking – no identifying information will be shared publicly. Below are the options provided by the DNV team (cc'ed) for next week (Eastern):

[INSERT DATES AND TIMES]

Thank you in advance for your feedback!

Introduction

Introduction of the Moderator

Good afternoon. My name is [NAME]. I am with DNV. We are conducting this small group discussion for NYSERDA. We want to talk today about your thoughts and opinions about your interactions with the NYSERDA Real Time Energy Management program (which I will call RTEM from here on out) and what role you think that support had in promotion and sales of these systems.

What is a moderator?

Before we begin, I want to go over the three things before we start the discussion.

First - I am the moderator and my job as the moderator is to:

1. Help guide the flow of conversation
2. Make sure everyone's comments are heard
3. Ensure that the questions NYSERDA is interested in are covered

Since we have a lot to cover, I may have to break off the conversation at times to move on to another topic area.

We are also recording our discussion today. This recording is only to aid in notetaking, and no identifying information will be shared publicly. In other words, neither your names nor organizations will be made known to the audience or in any research reports.

Ground Rules

Finally - I'd like to review some ground rules for today's discussion.

Sometimes I'll go around the virtual room and ask several of you for your input. At other times, I will just throw a topic open for general discussion. We want everyone to participate, but you don't have to answer every question.

There are no right and wrong answers. Please feel free to disagree or question each other. We expect differences in how people see things. We want to know about these differences. It's important to tell us **YOUR** thoughts, not what you think others think or want to hear.

The session will last for approximately the next hour. I will do my best to get you out on time.

Does anyone have any questions before we begin?

Introduction and involvement with the program

1. Let's start with introductions. Please introduce yourself—first name only—and tell us about:
    a. Your role in your company.
    b. Would you consider that the primary service you offer is Automated System Optimization (ASO) and/or Fault Detection Diagnostics (FDD)? **[Note, if needed, that this conversation is focused on RTEM systems for C&I buildings and probe on any other offerings besides ASO or FDD]**
    c. Your company involvement with the Real Time Energy Management (or RTEM) program? **[Probes: NYSERDA luncheons on available support for the RTEM systems you offer, individual meetings with NYSERDA staff to receive support on the sites where your systems are installed, receipt of NYSERDA incentives, or anything else we are missing?]**
2. What did you like or what do you like about the RTEM program?
3. What would you say was not so great about the program?
4. For how many years has your company been engaged with the NYSERDA RTEM program?
5. Do you have any ongoing interactions with NYSERDA's RTEM program? If yes, are they helpful?

NYSERDA and vendor engagement

6. Would you categorize your company's engagement with NYSERDA RTEM program as limited, extensive, or somewhere in between?
    a. **If engagement is extensive:**
        i. You noted your company engagement with the RTEM program is extensive, can you please explain?
        ii. Do you feel like the program helped your company evolve your RTEM products/service offerings?
        iii. **[IF YES TO ABOVE]** How?
    b. **If engagement is limited:**
        i. You noted your company engagement with the RTEM program is limited, can you please explain?
        ii. Is there anything that could change that would increase your company's engagement with the program? **[Probe, if needed: what could NYSERDA, specifically, change?]**

NYSERDA RTEM program influence on vendor's promotion and sales of RTEM systems/services

7. In addition to projects that your company brings to the RTEM program, do you install similar real time building energy management systems to sites not receiving any support from the NYSERDA RTEM program?
    a. **[If no:]** What are the main reasons for not installing similar real time energy management systems at sites outside of the program?
8. **[If they sell RTEM systems outside of the program]**
    a. What are the differences between your company's projects that receive NYSERDA RTEM support (either incentives or individual meetings with program staff) and those that do not?
        i. Probe for size, customer characteristics, whether recommendation to clients are different, whether actions that clients are doing are different, and if any difference in type of offering (offering equipment only or the full service)
    b. Thinking of all your sales where you install real time building energy management systems, what proportion of those sales go through the program (i.e., the installations receive NYSERDA support) and what proportion are not supported by the program? Your rough estimate is fine.
    c. **[IF NOT ADDRESSED IN a]** Why do some of your real time building energy management sales happen outside of the NYSERDA RTEM program?
    d. Are there ways that participation or affiliation with the NYSERDA RTEM program help you with your RTEM sales where no NYSERDA program support was received?
    e. **[IF YES TO ABOVE]** In what ways did participation or affiliation with the NYSERDA RTEM program help you with the real time building energy management sales where no NYSERDA program support was received? **[Probe: Do you recommend these real**

time systems more now because of the program? Has the engagement with the NYSERDA program made your offerings more reliable?]

f. **[If not mentioned]** Did any of those non-NYSERDA incentivized sales receive financial incentive from other organizations like the NY utilities? If so, what proportion roughly?

9. Without the RTEM program, how, if at all, would your real time building energy management services you offered be different?
10. In your opinion, qualitatively, how would your overall RTEM sales be different absent NYSERDA's program?

Wrap-up

11. Do you have anything else you want to share about this program or NYSERDA?

Appendix D Participating vendor in-depth interview guide

Memo to: Dana Nilsson, Cody Glavey-Weiss, and Michael Reed; NYSERDA

From: Kora Dreffs, Mersiha McClaren, and Mimi Goldberg; DNV

CC: Maura Nippert; DNV

Date: 3/7/2025

NYSERDA EMTE: Vendor IDI guide

Interview overview

Objective: The purpose of these conversations with participating RTEM vendors is two-fold: 1) to understand the program influence on adoption of RTEM system at participating sites and 2) to understand the influence on adoption of RTEM system at nonparticipating sites (i.e., the indirect influence).

Anticipated timing (interview length): 1 hour

Method of data collection: Phone interview

Table D-1 Research objectives mapped to questions in this instrument

Outputs/Outcomes	Indicators	Benefits/Evaluator	Vendor Questions
Variables affecting persistence of RTEM service contracts	Percent RTEM service contracts at least 5 years in duration	Indirect/Direct	15) e, 27)
Percent of RTEM projects that use services for non-energy benefits (e.g., long-term asset management, capital investment strategies, risk mitigation analyses)	Number of RTEM projects that use services for non-energy benefits after NYSERDA engagement Number of RTEM projects that use services for non-energy benefits during NYSERDA engagement	Indirect Direct	18), 24)
Increased use of EM for non-energy benefits	Percent (or number) of implemented measures installed after NYSERDA engagement	Indirect	24) c
Utilization of RTEM data sets to advance efforts at demand reduction & peak load shaving	Percent of vendors implementing demand reduction and peak load shaving for replication sites and other projects	Indirect	29)

Outputs/Outcomes	Indicators	Benefits/Evaluator	Vendor Questions
	within the vendor portfolio Percent of vendors implementing demand reduction and peak load shaving within RTEM sites/projects	Direct	
Demonstrated energy savings/O&M benefits from RTEM activities	Ratio of efficiency control measures (ECM) identified: ECMs implemented in addition to those recommended during NYSERDA engagement Estimate indirect benefits	Indirect/Direct	7) to 15), 17), 20), 21), 25), 26), 27); we will also use vendor reports from participating projects and participant/ customer interviews
RTEM providers identify & act on energy efficiency opportunities	Number/type of additional energy efficiency opportunities identified by RTEM providers (current and former)	Indirect	14), 15), 20), 21), 25), 26), 27); we will also use vendor reports from participating projects and participant/ customer interviews
Demonstrated energy savings/O&M benefits from RTEM activities	Ratio of efficiency control measures (ECM) identified: ECMs implemented in addition to those recommended during NYSERDA engagement Estimate indirect benefits	Indirect/Direct	7) to 15), 17), 20), 21), 25), 26), 27); we will also use vendor reports from participating projects and participant/ customer interviews
Verified gross energy impacts	kWh, MMBtu	Direct	20), 21), 22), 23), 30), 31) and vendor reports
Verified gross savings realization rate (VGSRR)	Ratio (%)		20), 21), 22), 23), 30), 31) and vendor reports
Verified savings as a percent of baseline energy consumption	Ratio (%)		20), 21), 22), 23), 30), 31) and vendor reports
Savings per incentive and/or program participant unit of measure	Ratio (%)		20), 21), 22), 23), 30), 31) and vendor reports

Interview

Email interview invitation letter

Subject Line: NYSERDA wants your input about their RTEM Program

Hello *[NAME],*

NYSERDA has contracted DNV to evaluate its Real Time Energy Management (RTEM) program. NYSERDA's RTEM program records show that your company, as a program qualified vendor, works with clients who installed an RTEM system and received an incentive for it from the program – thank you!

DNV is reaching out to RTEM program qualified vendors like your company to gather feedback about your experiences with the program and any influence the program may have had on your RTEM or building energy management services and business. This information will help NYSERDA improve future program offerings. We would like to speak with the person at your organization (either you or another staff member) who is knowledgeable about your company involvement with the NYSERDA RTEM program.

We expect the discussion to take up to 1 hour. **To thank you for your time, we will send you a $250 e-gift card following completion of the conversation.**

Please respond via email to let us know which of these times you are available for a conversation. Below is the availability of the DNV team for next week (Eastern):

[INSERT DATES AND TIMES]

You can reach out to me or *[INPUT NYSERDA CONTACT NAME AND EMAIL],* cc'd on this email, if you have any questions about this study.

Thank you in advance for your feedback!

Respectfully,

[INSERT DNV CONTACT NAME, EMAIL, AND PHONE]

Introduction

Thank you for meeting with me. My name is *[___],* and I am with DNV. On behalf of the New York State Energy Research and Development Authority (NYSERDA), DNV is conducting a study to assess NYSERDA's Real Time Energy Management or RTEM program. Your feedback will help us understand the impact of NYSERDA's RTEM program.

All of your responses will be confidential to the extent permitted by law including but not limited to the Freedom of Information Law (FOIL), and any analyses will not identify individuals. *[If needed:]* We expect this conversation to last approximately one hour.

[If needed:] At the completion of this conversation, we will send you a $250 e-gift card to thank you for your time.

I would like to record this call for my note-taking purposes. Do I have your permission? We will keep your responses anonymous and remove any identifying information in our reports.

Background

First, I would like to start by gathering some background information about you and your company.

1) What is your role at your company?
2) Can you briefly describe your involvement with the NYSERDA's RTEM commercial program?
3) How familiar are you with the NYSERDA RTEM commercial program?
    a) *[Interviewer: If respondent reports limited involvement and familiarity with the program, ask for a different person at their organization who is more directly involved in NYSERDA's RTEM program, record the new contact information, and still complete the interview with the current contact to obtain as much information as possible. At the conclusion of the interview, ask the person to help you reach out to the other contact(s) to fill out the missing information.]*
4) How long has your company been a qualified vendor for NYSERDA's RTEM program?
5) Does your company offer fault detection diagnostic or FDD as part of your energy building management?
6) Does your company offer automated system optimization or ASO as part of your energy building management?

Assessing if any RTEM installations happened outside of the program

7) As you know, RTEM technology is the combination of building data collection systems (sensors, meters, equipment feeds) with data analytics and building data information services able to show building management the actual state of building performance at any point in time. To phrase it differently, products like your company's capture the building data such as set points, power loads, flow rates, temperature and humidity via a building data collection system, and feed the information back to building operators with key insights about operations to help them fine-tune the building and identify capital projects. So, thinking of this RTEM technology:

    Since 2020, at how many sites in New York has your company installed an RTEM type technology?

    Your best estimate is fine. *[Interviewer**:** If contact is struggling to offer this estimate because five years is a long-time frame to be able to recall this information, then ask if they can estimate for either the past three, two, or one year. For the next two subsequent questions, use the timeframe the contact used to offer this estimate.]*

8) Since 2020 *[or adjust timeframe if needed based on Q7],* about what proportion of those RTEM installations that your company did in New York would have qualified for the NYSERDA RTEM program funding? Your best estimate is fine. By "qualified", we mean the RTEM installation is capable of: 1) monitoring energy usage at hourly interval and at levels more granular than the whole-building; 2) the RTEM service could not solely consist of software as a service, and 3) installed in a commercial facility that receives its electricity from an investor-owned New York utility.

9) Since 2020 *[or adjust timeframe if needed based on Q7],* there were *[state number from below that corresponds to the relevant timeframe]* NYSERDA-funded RTEM installations associated with your company, per NYSERDA records. Is this correct?

   # of NYSERDA -funded RTEM installations since 2020: *[Input prior to the interview]*

   # of NYSERDA -funded RTEM installations in the past three years: *[Input prior to the interview]*

   # of NYSERDA -funded RTEM installations in the past two years: *[Input prior to the interview]*

   # of NYSERDA -funded RTEM installations in the past year: *[Input prior to the interview]*

   a) This means that *[Estimate percent]%* of your company's RTEM installations in this time frame were qualified to receive NYSERDA program funding received program funding. Is this about right? *[Interviewer: To estimate this percent, take the number stated from Q9 and divide it by the total number of qualified RTEM installations. Compute qualified RTEM installations by taking the total RTEM installations from Q7 and multiplying it with the % from Q8. Have a spreadsheet open with the appropriate formulas to compute this information quickly based on responses to the relevant questions.]*

NYSERDA RTEM program influence

10) Since your affiliation with the NYSERDA RTEM program, is your company recommending RTEM technology more often, less often, or about the same compared to before working with the program?

11) On a scale of 0 to 10, where 0 means no influence and 10 means a great influence, how much influence did the NYSERDA RTEM program have on your company's practice of recommending the RTEM technology?

12) Did your partnership with the NYSERDA RTEM program help increase the amount of RTEM contracts your organization obtained over time?

   a) [*If yes*] If NYSERDA RTEM program was not around, what proportion of your RTEM contracts in the past five years would have still occurred?

Differences between NYSERDA RTEM and non-NYSERDA RTEM projects

13) *[Ask if some qualifying installation* ***did not receive*** *NYSERDA RTEM program funding, Q9:]* Our next question is asking about your company's RTEM installations *that were not funded* by the NYSERDA RTEM program. These installations include customers with RTEM sites that did not participate in the NYSERDA RTEM program and customers that did participate in the NYSERDA RTEM program but have also installed RTEM systems at other sites without NYSERDA funding.

   Thinking about those qualifying RTEM installations that DID NOT receive NYSERDA RTEM funding, what proportion of those RTEM installations received funding from a New York utility? Your best estimate is fine.

14) Thinking of the types of RTEM recommendations you make or the ways you report those to customers, is that practice the same or different for RTEM installation projects going through the utility RTEM program compared to the projects going through the NYSERDA RTEM program?

    a) *[If different:]* Please explain what is different.

15) I would also like to learn how NYSERDA-funded RTEM installation projects compare to RTEM projects without NYSERDA funding.

    a) Are NYSERDA-funded projects larger, smaller, or similar in size, on average? By size we mean roughly the same "typical" building square footage.

    b) Are the kinds of things (e.g., measures, actions, and/or systems) that you recommend to customers to save energy similar or different between the two types of projects? If different, please explain.

    c) Do customers adopt less, more, or about the same number of actions between the two types of projects, on average?

        i) *[If less or more:]* How much less/more? Please answer using a percentage, such as 20% less/more actions are adopted for NYSERDA-funded versus the non-NYSERDA-funded project.

Non-NYSERDA RTEM project questions

16) *[Ask if some qualifying installation **did not receive** NYSERDA RTEM program funding, Q9:]* Thinking about those qualifying RTEM installations that DID NOT receive NYSERDA funding:

    a) What percent included fault detection diagnostic or FDD? Your best estimate is fine.

    b) What percent included automated system optimization or ASO? Your best estimate is fine.

    c) What percent of those RTEM systems are still installed?

    d) What percent of those RTEM systems are in still in use - that is, either your company or the customer is using them to monitor the building performance?

    e) And what percent of those installations were under a RTEM service contract with your company for at least 5 years?

17) Again, thinking of those RTEM technology installations that DID NOT receive NYSERDA funding, how influential – on average - do you think your company was on the customer's decision to install such systems? Use scale from zero to ten, with 0 indicating not at all influential and 10 indicating extremely influential.

18) Thinking of those same RTEM technology installations that DID NOT receive NYSERDA funding, for what percent of them have you produced recommendations to help clients achieve non-energy benefits? By non-energy benefits, we mean other benefits in addition to energy and demand savings, such as improved indoor air-quality, water bill savings, improved productivity of building or facility operations staff, and so forth.

19) Is your company implementing a demand reduction or peak load shaving strategy for a utility or NYISO by leveraging RTEM sites or projects that were **not** funded by NYSERDA?

NYSERDA RTEM project questions

Now, I would like to ask you primarily about your experience with NYSERDA's RTEM program and projects that were funded by that program.

20) Thinking of NYSERDA-funded RTEM installation projects, does your company typically document all your RTEM recommended actions to the client in the quarterly reports you submit to NYSERDA?
    a) *[If not:]* On average, what proportion of the actions that you recommend are not documented in the reports you submit to NYSERDA? Your best estimate is fine.
    b) *[If not:]* What types of recommended actions do you typically not document in the reports submitted to NYSERDA?
    c) How do you make recommendations that are not documented in the reports submitted to NYSERDA? Are they documented elsewhere?
    d) What suggestions do you have on how to improve the reports that are submitted to NYSERDA?
21) Of those energy savings actions that you recommended while you and your client were engaged with the NYSERDA RTEM program, what percent were implemented by the client, on average?
22) Which energy savings actions were most commonly implemented? *[Probes: will add once we review vendor reports]*
23) Which energy savings actions were least commonly implemented? *[Probes: will add once we review vendor reports]*
24) For our next questions about the NYSERDA-funded RTEM installation projects, we want you to think about two time periods: the time when the project was still engaged with the program (referred to as Time 1) and the time after that engagement stopped (referred to as Time 2).
    a) For the Time 1 period, for what percent of those installations have you produced recommendations to help clients achieve non-energy benefits? Your best estimate is fine.
    b) For the Time 2 period, for what percent of those installations have you produced recommendations to help clients achieve non-energy benefits? Your best estimate is fine.
    c) On average, how many RTEM recommended non-energy focused actions were adopted annually after the NYSERDA RTEM program engagement concluded?
25) Thinking of the NYSERDA-funded RTEM installations at sites that concluded their engagement with the NYSERDA RTEM program, what proportion of those sites are still using the RTEM system?
26) Thinking of the NYSERDA-funded RTEM installations at sites that concluded their engagement with the NYSERDA RTEM program AND are still using the RTEM system, on average, how many energy savings actions at those sites are adopted annually after the NYSERDA RTEM program engagement concluded?
    a) Thinking of the same sites, are the kinds of things that are adopted by customers to save energy similar or different to what was adopted during NYSERDA engagement? If different, please explain.

27) Still thinking of the NYSERDA-funded RTEM installations, is there a mechanism in place to report that a recommendation has stopped being implemented?

    a) *[If yes]:* Please elaborate on how that is reported.

28) What percent of NYSERDA-funded RTEM installations were under the RTEM service contract with your company for at least 5 years?

29) Is your company implementing a demand reduction or peak load shaving strategy for a utility or NYISO by leveraging the NYSERDA-funded RTEM sites or projects?

Now I'd like to ask you a few questions about two specific projects that you have worked on that NYSERDA RTEM program funded.

30) The first project we want to know about is: *[input name of the client and address of the site].*

    a) We see in the reports you submitted to NYSERDA that you recommended the following actions: *[prior to this interview, input a brief summary of recommended actions].* What else have you recommended that is not listed in the reports? [Probe from top 10 that are not included in the report: equipment control in bypassed/override/manual mode, fault devices (e.g., leaky valves, sensors, controllers), extensive operations during unoccupied periods, set points too high/low or inconsistent, inefficient equipment/plant sequencing, coincidental equipment operation generating high demand, convert constant set points to conditionals, free cooling/heating opportunities not used, unintended heating, cooling and simultaneous conditioning, manual operations that should be automated].

    b) *[If in the reports:]* We see in the reports also the actions that are implemented. The client implemented: *[prior to this interview, input a brief summary of implemented actions].* Did they implement anything else that we should know about? *[Probe for whether actions that could yield significant savings were implemented, if not noted, such as anything related to heating, cooling, and water heating.]*

        i) *[If other actions are listed, ask:]* Were these actions implemented during the NYSERDA engagement or after the engagement concluded?

    c) *[If implemented actions are not listed in the report, ask:]* What actions were implemented for this RTEM project? Please note which were implemented while you and client engaged with NYSERDA and which ones were implemented after that engagement concluded.

    d) For this project, have you or your client implemented the fault detection and diagnostics or FDD?

31) The second project we want to know about is: *[input name of the client and address of the site].*

    a) We see in the reports you submitted to NYSERDA that you recommended the following actions: *[prior to this interview, input a brief summary of recommended actions].* What else have you recommended that is not listed in the reports? *[Probe from top 10 that are not included in the report: equipment control in bypassed/override/manual mode, fault devices (e.g., leaky valves, sensors, controllers), extensive operations during unoccupied periods, set points too high/low or inconsistent, inefficient equipment/plant sequencing, coincidental equipment operation generating high demand, convert constant set points to conditionals, free cooling/heating opportunities not used, unintended heating, cooling and simultaneous conditioning, manual operations that should be automated].*

b) *[If in the project reports:]* We see in the reports also the actions that are implemented. The client implemented: *[prior to this interview, input a brief summary of implemented actions]*. Did they implement anything else that we should know about? *[Probe for whether actions that could yield significant savings were implemented, if not noted, such as anything related to heating, cooling, and water heating.]*

   i) *[If contact noted other actions, ask:]* Were these actions implemented during the NYSERDA engagement or after the engagement concluded?

c) *[If implemented actions are not listed in the project reports, ask:]* What actions were implemented for this RTEM project? Please note which were implemented while you and the client engaged with NYSERDA and which ones were implemented after the engagement concluded.

d) For this project, have you or your client implemented the fault detection and diagnostics or FDD?

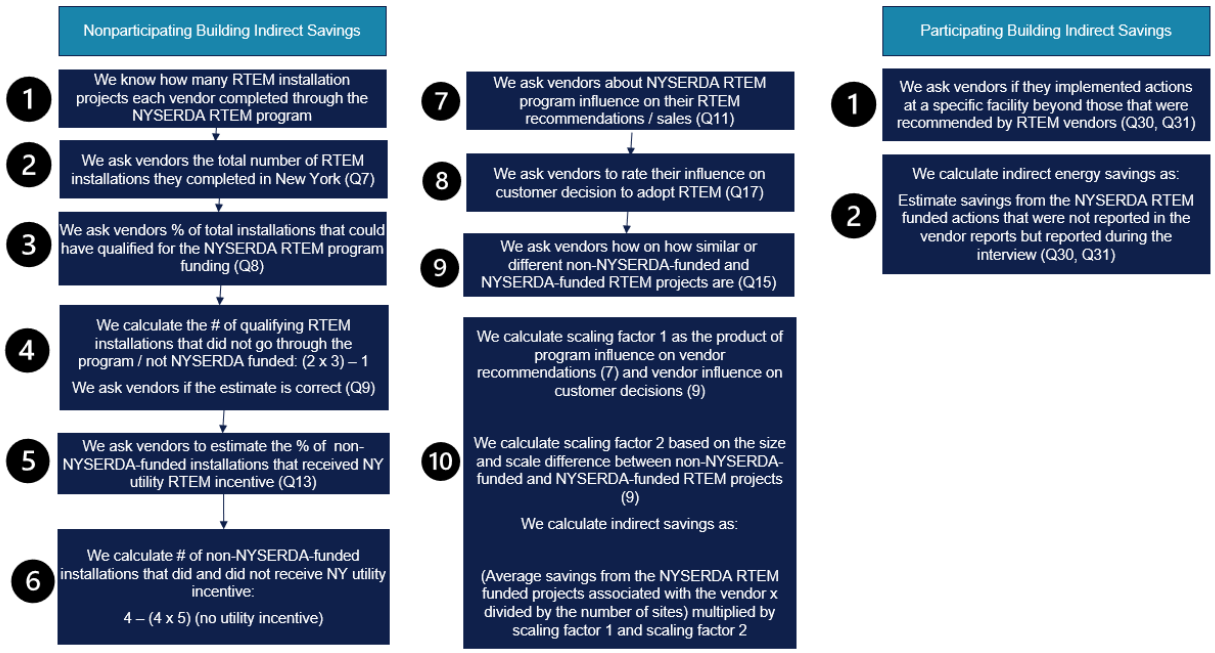
Closing

These are all my questions at this time. If I need to, can I email you to clarify any of the responses you provided today?

Thank you!

Indirect benefits algorithm – how information from questions above will be used to estimate indirect benefits

Below we offer a graphic to visualize how certain questions in this guide will be used to estimate indirect benefits.



Appendix E Participating customer in-depth interview guide

Memo to: Dana Nilsson, Cody Glavey-Weiss, and Michael Reed; NYSERDA

From: Kora Dreffs, Mersiha McClaren, and Mimi Goldberg; DNV

CC: Maura Nippert; DNV

Date: 4/10/2025

NYSERDA EMTE: Participant IDI guide

Interview Overview

Objective: The purpose of these conversations with previous RTEM participants is to understand the direct and indirect influence of the program on participant adoption (at participating buildings and at other buildings in respondents' portfolios) of energy saving measures recommended by the RTEM system and/or RTEM vendor.

Anticipated timing (interview length): 45 minutes – 1 hour

Method of data collection: Phone interview

Outputs/Outcomes	Indicators	Benefits/Evaluator	Vendor Questions
Increased awareness of using EM to support capital project planning	Percent of building owners/managers aware/knowledgeable of RTEM long-term capital project planning	Direct	13, 23
	Percent of owners/managers participating in NYSERDA Training courses	Indirect	N/A – expected in 2024 but not completed by program
Increased use of EM	Percent of owners/managers implementing optimal start/stop	Direct	8,18
	Percent of owners implementing fault detection and diagnostics (FDD)	Direct	5.b.i,5.c.i
Customer confidence in EM results	Percent (or number) of implemented measures	Indirect	5, 6, 15, 5.d.i

Outputs/Outcomes	Indicators	Benefits/Evaluator	Vendor Questions
	installed after NYSERDA engagement		
Variables affecting persistence of RTEM service contracts	Percent RTEM service contracts at least 5 years in duration	Indirect/Direct	11, 21
Percent of RTEM projects that use services for non-energy benefits (e.g., long-term asset management, capital investment strategies, risk mitigation analyses)	Number of RTEM projects that use services for non-energy benefits after NYSERDA engagement Number of RTEM projects that use services for non-energy benefits during NYSERDA engagement	Indirect Direct	5, 6, 15, 5.d.i
Increased use of EM for non-energy benefits	Percent (or number) of implemented measures installed after NYSERDA engagement	Indirect	5, 6, 15, 5.d.i
	Percent of tenants including RTEM/EM stipulations within lease requests	Indirect	5, 6, 15, 5.d.i
	Percent reduction in tenant hot/cold calls	Direct	5, 6, 15, 5.d.i
	Percent of owners/managers implementing occupancy-based management	Direct	5, 6, 15, 5.d.i
Demonstrated energy savings/O&M benefits from RTEM activities	Ratio of efficiency control measures (ECM) identified: ECMs implemented in addition to those recommended during NYSERDA engagement Estimate indirect benefits	Indirect/Direct	4 through 31 (info on NYSERDA-funded RTEM projects) 32 through 43 (info on non-NYSERDA-funded RTEM projects)
RTEM providers identify & act on energy efficiency opportunities	Number/type of additional energy efficiency opportunities identified by RTEM providers (current and former)	Indirect	5, 6, 15, 5.d.i

Outputs/Outcomes	Indicators	Benefits/Evaluator	Vendor Questions
Verified gross energy impacts	kWh, MMBtu	Direct	4 through 31 (info on NYSERDA-funded RTEM projects) and vendor reports
Verified gross savings realization rate (VGSRR)	Ratio (%)		0 through 31 and vendor reports
Verified savings as a percent of baseline energy consumption	Ratio (%)		0 through 31, vendor reports, and energy consumption data
Savings per incentive and/or program participant unit of measure	Ratio (%)		0 through 31 and vendor reports

Email interview invitation letter

Hi [PARTICIPANT NAME],

NYSERDA has contracted DNV to evaluate NYSERDA's Real Time Energy Management (RTEM) program. Our records show that as a participating building owner/manager through the program, you received a financial incentive from NYSERDA for the upfront cost of installing an RTEM system and for ongoing RTEM services.

DNV would like to speak to you about your experience with the NYSERDA RTEM program and how that experience affected your subsequent use of RTEM. This information will help NYSERDA determine what technology to continue to offer incentives for. We would like to speak with you, or another employee at your organization, who is knowledgeable about the RTEM program and project implementation.

We expect the discussion to take approximately one hour. To thank you for your time, we will send you a $250 e-gift card following completion of the conversation.

Please let us know all times when the appropriate contact from your organization is available for a conversation. Below are the options provided by the DNV team (cc'ed) for next week (Eastern):

[DATES AND TIMES]

Thank you in advance for your feedback!

Introduction

Hi, my name is [DNV INTERVIEWER NAME], and I'm calling from DNV on behalf of the New York State Energy Research and Development Authority (NYSERDA). I'm calling today to get some information to help improve NYSERDA's Real Time Energy Management (RTEM) program that you've had some experience with. NYSERDA has contracted with our team to conduct an evaluation of the program.

We expect this conversation to last approximately one hour. At the completion of this conversation, we will send you a $250 e-gift card to thank you for your time.

I would like to record this call for my note-taking purposes. Do I have your permission? We will keep your responses anonymous and remove any identifying information in our reports.

Background

First, I would like to start by gathering some background information about you and your company.

1. What is your role at your company?
2. Can you briefly describe your involvement with the NYSERDA's RTEM commercial program?
3. Can you also describe your involvement with the RTEM vendor, [VENDOR NAME]. ? Our records show they helped install the RTEM system at your building(s) as well as recommended energy savings actions for your organization to implement that were based on the RTEM building performance feedback.

RTEM actions recommended and implemented

[If they did multiple RTEM installations / projects, say]: I'd like to ask you some questions about two specific sites where you installed an RTEM system that NYSERDA RTEM program funded.

Site/Building #1

The first site we want to know about is: [SITE/BUILDING ADDRESS #1].

4. *[If recommended actions are listed in the reports]:* We see in the reports your vendor submitted to NYSERDA that the vendor **recommended** to your organization the following energy saving actions for this building. Has your vendor recommended anything not already included in this list?

- [BRIEF SUMMARY/LIST OF **RECOMMENDED** ACTIONS FOR SITE/BUILDING #1].

[PROBE for top 10 vendor-recommended RTEM actions that are not included in the report: equipment control in bypassed/override/manual mode, fault devices (e.g., leaky valves, sensors, controllers), extensive operations during unoccupied periods, set points too high/low or inconsistent, inefficient equipment/plant sequencing, coincidental equipment operation generating high demand, convert constant set points to conditionals, free cooling/heating opportunities not used, unintended heating, cooling and simultaneous conditioning, manual operations that should be automated].

5. *[If implemented actions are listed in the reports:]* Your vendor reports also indicate that your organization **implemented** the following recommended actions at this building:
    - [BRIEF SUMMARY/LIST OF **IMPLEMENTED** ACTIONS FOR SITE/BUILDING #1].
    a. Have you implemented all of the listed actions?
        i. [NO]: Which of these actions have you not yet implemented?
    b. Have you implemented any additional improvements of the building's energy use since installation of the RTEM system? [PROBE for actions that could yield significant energy savings such as heating, cooling, and water heating system improvements.]
    c. [If other actions were implemented, ask:] Were these additional actions implemented during the NYSERDA RTEM program engagement or after the engagement concluded?
    d. Of the actions you have implemented, did any actions achieve additional benefits beyond energy savings? Please respond yes or no.
        i. tenants including RTEM/EM stipulations within lease requests [*If yes*] What percent of the tenants included those stipulations?
        ii. fewer tenant hot/cold calls, indicating increased comfort [*If yes*] How much less (in percentage terms)?
        iii. increased productivity due to implementation of occupancy-based management [If yes] What is the measure of productivity, and how much did it increase (in percentage terms)?
        iv. improved air quality (due to damper changes/fault detection/equipment repair recommendations, etc). [If yes] What has indicated improved air quality, and how much did it increase (in percentage terms)?
        v. other [PROBE]
6. *[If implemented actions are not listed in the report]:* What actions were implemented at [SITE/BUILDING ADDRESS #1] that the RTEM system and/or vendor recommended?

a. [Go through each implemented action to ask]: Was [ACTION] implemented while you were engaged with NYSERDA or after program engagement concluded. *[PROBE for actions that could yield significant energy savings, if not noted, such as anything related to heating, cooling, and water heating.]*

b. Of the actions you have implemented, did any actions achieve additional benefits beyond energy savings? Please respond yes or no.

   i. tenants including RTEM/EM stipulations within lease requests [*If yes*] What percent of the tenants included those stipulations?

   ii. fewer tenant hot/cold calls, indicating increased comfort [*If yes*] How much less (in percentage terms)?

   iii. increased productivity due to implementation of occupancy-based management [If yes] What is the measure of productivity, and how much did it increase (in percentage terms)?

   iv. improved air quality (due to damper changes/fault detection/equipment repair recommendations, etc). [If yes] What has indicated improved air quality, and how much did it increase (in percentage terms)?

   v. other [PROBE]

7. At this building, does the RTEM system include fault detection and diagnostics or FDD? [*If needed: FDD identifies and diagnoses faults or problems in systems and equipment, like HVAC, lighting, and electrical systems, using data analysis and specialized algorithms to enable efficient maintenance and repair.*

   a. [*If yes*] Is your system using FDD to help you identify issues with the equipment or building operations?

8. At this building, does the RTEM system include automated system optimization or ASO? [*If needed: ASO for start/stop, often called optimal start/stop, aims to maximize energy efficiency and equipment lifespan by strategically scheduling the activation and deactivation of systems like HVAC, based on occupancy patterns and building conditions.*

   a. Do you use this ASO feature to optimize start and stop of equipment?

9. Is the RTEM system still installed at the building?

10. Are you still actively using that RTEM system and/or the vendor to monitor and improve building performance?

11. At this building, how long (in terms of years) was your organization under the RTEM service contract with the RTEM vendor?

12. Other than the building system improvements we have discussed, have there been any changes to the facility operation since the RTEM system installation that would affect energy consumption, such as changes in building uses, occupancy, air conditioning added, etc?

13. Finally, what capital upgrades have you considered or implemented to this building?

a. [If capital upgrades are described] How did RTEM data help you to determine what capital updates to prioritize or implement?

Site/Building #2

[*Only for contacts that represent multiple RTEM installations:*] We will now repeat the questions for a second site or building: [SITE/BUILDING ADDRESS #2].

14. *[If recommended actions are listed in the reports]:* We see in the reports your vendor submitted to NYSERDA that the vendor **recommended** to your organization the following energy saving actions for this building. Has your vendor recommended anything not already included in this list?

    - [BRIEF SUMMARY/LIST OF **RECOMMENDED** ACTIONS FOR SITE/BUILDING #1].

    [PROBE for top 10 vendor-recommended RTEM actions that are not included in the report: equipment control in bypassed/override/manual mode, fault devices (e.g., leaky valves, sensors, controllers), extensive operations during unoccupied periods, set points too high/low or inconsistent, inefficient equipment/plant sequencing, coincidental equipment operation generating high demand, convert constant set points to conditionals, free cooling/heating opportunities not used, unintended heating, cooling and simultaneous conditioning, manual operations that should be automated].

15. *[If implemented actions are listed in the reports:]* Your vendor reports also indicate that your organization **implemented** the following recommended actions at this building:

    - [BRIEF SUMMARY/LIST OF **IMPLEMENTED** ACTIONS FOR SITE/BUILDING #2].

    a. Have you implemented all of the listed actions?

        i. [If NO]: Which of these actions have you not yet implemented?

    b. Have you implemented any additional improvements of the building's energy use since installation of the RTEM system? [PROBE for actions that could yield significant energy savings such as heating, cooling, and water heating system improvements.]

    c. [If other actions were implemented, ask:] Were these additional actions implemented during the NYSERDA RTEM program engagement or after the engagement concluded?

    d. Of the actions you have implemented, did any actions achieve additional benefits beyond energy savings? Please respond yes or no.

        i. tenants including RTEM/EM stipulations within lease requests [*If yes*] What percent of the tenants included those stipulations?

ii. fewer tenant hot/cold calls, indicating increased comfort [*If yes*] How much less (in percentage terms)?

iii. increased productivity due to implementation of occupancy-based management [If yes] What is the measure of productivity, and how much did it increase (in percentage terms)?

iv. improved air quality (due to damper changes/fault detection/equipment repair recommendations, etc). [If yes] What has indicated improved air quality, and how much did it increase (in percentage terms)?

v. other [PROBE]

16. *[If implemented actions are not listed in the report, ask:]* What actions were implemented at [SITE/BUILDING #2 ADDRESS] that the RTEM system and/or vendor recommended?

    a. [Go through each implemented action to ask]: Was [ACTION] implemented while you were engaged with NYSERDA or after program engagement concluded. *[PROBE for actions that could yield significant energy savings, if not noted, such as anything related to heating, cooling, and water heating.]*

    c. Of the actions you have implemented, did any actions achieve additional benefits beyond energy savings? Please respond yes or no.

        i. tenants including RTEM/EM stipulations within lease requests [*If yes*] What percent of the tenants included those stipulations?

        ii. fewer tenant hot/cold calls, indicating increased comfort [*If yes*] How much less (in percentage terms)?

        iii. increased productivity due to implementation of occupancy-based management [If yes] What is the measure of productivity, and how much did it increase (in percentage terms)?

        iv. improved air quality (due to damper changes/fault detection/equipment repair recommendations, etc). [If yes] What has indicated improved air quality, and how much did it increase (in percentage terms)?

        v. other [PROBE]

17. At this building, does the RTEM system include fault detection and diagnostics feature, or FDD? [*If needed: FDD identifies and diagnoses faults or problems in systems and equipment, like HVAC, lighting, and electrical systems, using data analysis and specialized algorithms to enable efficient maintenance and repair].*

    a. [*If yes*] Is your system using FDD to help you identify issues with the equipment or building operations?

18. At this building, does the RTEM system include automated system optimization or ASO? [*If needed: ASO for start/stop, often called optimal start/stop, aims to maximize energy efficiency and equipment lifespan by strategically scheduling the activation and deactivation of systems like HVAC, based on occupancy patterns and building conditions].*

a. Do you use this ASO feature to optimize start and stop of equipment?

19. Is the RTEM system still installed at the building?
20. Are you still actively using that RTEM system and/or the vendor to monitor and improve building performance?
21. At this building, how long (in terms of years) was your organization under the RTEM service contract with the RTEM vendor?
22. Other than the building system improvements we have discussed, have there been any changes to the facility operation since the RTEM system installation that would affect energy consumption, such as changes in building uses, occupancy, air conditioning added, etc?
23. Finally, what capital upgrades have you considered or implemented to this building?
    a. [If capital upgrades are described] How did RTEM data help you to determine what capital updates to prioritize or implement?

Influence

24. How influential – on average – do you think the RTEM vendor was on your decision to install the RTEM system at the building(s) we talked about? Use scale from zero to ten, with 0 indicating not at all influential and 10 indicating extremely influential.
25. How influential – on average – do you think the RTEM vendor was on your decision to implement actions that the RTEM system helped identify at the building(s) we talked about? Use scale from zero to ten, with 0 indicating not at all influential and 10 indicating extremely influential.
26. How influential – on average – do you think the NYSERDA RTEM commercial program was on your decision to install the RTEM system? Use scale from zero to ten, with 0 indicating not at all influential and 10 indicating extremely influential.
27. How influential – on average – do you think the NYSERDA RTEM commercial program was on your decision to implement actions that the RTEM system helped identify at the building(s) we talked about? Use scale from zero to ten, with 0 indicating not at all influential and 10 indicating extremely influential.
28. If you had 10 points to allocate for influential factors on your decision to install the RTEM system, how many points would you give to each:
    a. The RTEM vendor you worked with
    b. NYSERDA RTEM program
    c. Other factors
29. You gave [say what they gave in Q28] points to other factors. What are the other factors that influenced your decision to install the RTEM system?
30. If you had 10 points to allocate for influential factors on your decision to implement actions that the RTEM system helped identify, how many points would you give to each:
    a. The RTEM vendor you worked with

b. NYSERDA RTEM program

c. Other factors

31. You gave [say what they gave in Q30] points to other factors. What are the other factors that influenced your decision to implement actions that the RTEM system helped identify?

Additional RTEM actions taken at other locations

32. Has your organization installed an RTEM system at another site or sites for which you have not received NYSERDA-RTEM program funding?

[*If YES or installed at other sites; continue.*]

[*If NO, skip to Section 2.7.*]

33. At how many other sites have you installed the RTEM system?

34. Were these installations done during your engagement or after your engagement ended with the NYSERDA RTEM program?

35. Did you receive funding from a NY utility for any of those installations?

    a. [*If YES*] For which ones?

36. I would like to learn how non-NYSERDA-funded RTEM installation projects compare to RTEM projects that received NYSERDA funding.

    a. Are the sites without NYSERDA and utility funding for RTEM similar in size (in terms of square footage) to the sites with NYSERDA-funded RTEM system?

        i. *[If different]:* How much larger or smaller in terms of square footage?

    b. Are the sites with utility-funded RTEM similar in size (in terms of square footage) to the sites with NYSERDA-funded RTEM system?

        i. *[If different]:* How much larger or smaller in terms of square footage?

37. Are the kinds of things (e.g., measures, actions) to save energy that RTEM system and/or vendor recommends similar or different between the sites without NYSERDA and utility funding for RTEM and sites with NYSERDA-funded RTEM?

    a. *[If different]:* Please explain.

    b. Similarly, are the kinds of things (e.g., measures, actions) to save energy that RTEM system and/or vendor recommends similar or different between the sites with utility-funded RTEM and sites with NYSERDA-funded RTEM?

        i. [*If different:*] Please explain.

38. Does your organization adopt less, more, or about the same number of actions between the sites without NYSERDA and utility funding for RTEM and sites with NYSERDA-funded RTEM, on average?

a. *[If less or more:]* How much less/more? Please answer using a percentage, such as 20% less/more actions are adopted for sites without NYSERDA and utility funding for RTEM compared to sites that had NYSERDA-funded RTEM.

b. Similarly, does your organization adopt less, more, or about the same number of actions between the sites with utility-funded RTEM and sites with NYSERDA-funded RTEM, on average?

    i. *[If less or more:]* How much less/more? Similarly, please answer using a percentage, such as 20% less/more actions are adopted for sites with utility-funded RTEM compared to sites that had NYSERDA-funded RTEM.

39. Thinking of those RTEM installations that DID NOT receive NYSERDA funding, how much influence each of the following had on your decision to install such systems? Use scale from zero to ten, with 0 indicating not at all influential and 10 indicating extremely influential.

    a. Experience with the NYSERDA RTEM commercial program

    b. RTEM Vendor who helped you participate in the NYSERDA RTEM commercial program

40. How much influence each of the following had on your decision to implement energy savings actions at the sites with the non-NYSERDA RTEM system and identified by the system. Please answer with a number from 0-10 where 0 means not at all influential and 10 means extremely influential.

    a. Experience with the NYSERDA RTEM commercial program

    b. RTEM Vendor who helped you participate in the NYSERDA RTEM commercial program

41. If you had 10 points to allocate for influential factors on your decision to install the RTEM system that DID NOT receive NYSERDA funding, how many points would you give to each:

    a. Experience with the NYSERDA RTEM commercial program

    b. RTEM Vendor who helped you participate in the NYSERDA RTEM commercial program

    c. Other factors

42. You gave [say what they gave in Q41] points to other factors. What are the other factors that influenced your decision to install the RTEM system that DID NOT receive NYSERDA funding?

43. If you had 10 points to allocate for influential factors on your decision to implement energy savings actions at the sites with the non-NYSERDA-funded RTEM system and identified by the system, how many points would you give to each:

    a. Experience with the NYSERDA RTEM commercial program

b. RTEM Vendor who helped you participate in the NYSERDA RTEM commercial program

c. Other factors

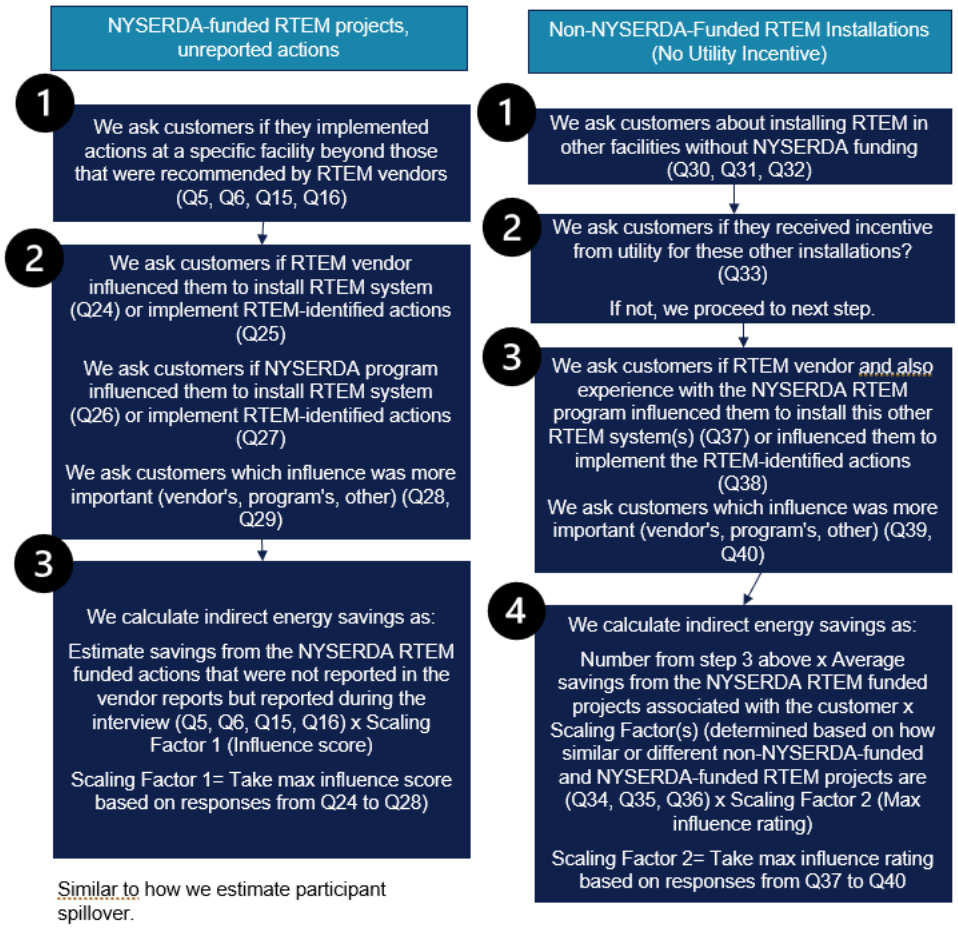
44. You gave [say what they gave in Q43] points to other factors. What are the other factors that influenced your decision to implement actions that the non-NYSERDA-funded RTEM system helped identify?

Closing

These are all my questions at this time. If needed, may I email you to clarify any of the responses you provided today?

Thank you!

Below we include a diagram of how we will use inputs from this guide to estimate indirect benefits / indirect savings.



Appendix F ConEdison and National Grid program staff in-depth interview guide

Memo to: Dana Nilsson, Cody Glavey-Weiss, and Michael Reed; NYSERDA
CC: Maura Nippert; DNV
From: Kora Dreffs, Mersiha McClaren, and Mimi Goldberg; DNV
Date: 2/20/2025

NYSERDA EMTE: ConEdison/National Grid program staff in-depth interview (IDI) guide

Interview overview

Objective: The objective of the interview with ConEdison and National Grid program staff is to ascertain whether NYSERDA influenced the development and implementation of their RTEM program. If there is an identifiable influence, the team will assess to what extent, if at all, NYSERDA may be able to claim indirect benefits resulting from projects executed through these utility programs.

Anticipated timing (interview length): 30 minutes

Method of data collection: Phone interview

Table 1 Research Objectives Mapped to Questions in This Instrument

Research Objectives	Interview Questions Address the Objectives
What are the interviewee's roles and responsibilities within the scope of their RTEM program? And have they been involved with the program long enough to tell us about their or ConEdison / National Grid program's staff interactions with NYSERDA.	1 through 3 and 6
To what extent are they familiar with the NYSERDA RTEM program? How is their RTEM program different or similar to NYSERDA's RTEM program?	4, 5
How did ConEdison / National Grid interact with NYSERDA to learn more about NYSERDA's RTEM program?	6 through 9
How much, if at all, did NYSERDA program staff influence the ConEdison / National Grid RTEM program design and/or delivery?	10
How many sites installed the ConEd funded RTEM system(s) to date?	14
Does ConEdison / National Grid claim indirect benefits from their RTEM program? If so, how?	11 through 13
What is the indirect energy savings impact if they claim it?	15

Interview

Email Interview Invitation Letter

Subject Line: NYSERDA seeks input about your Real Time Management (RTEM) Program

Dear [NAME],

NYSERDA has contracted DNV to evaluate their Real Time Energy Management (RTEM) program.

DNV would like to speak to [ConEdison/National Grid] staff to understand New York utility run RTEM programs. We also want to learn of any coordination over time between the NYSERDA's RTEM staff and your RTEM program staff. We would like to speak with those in your organization who are knowledgeable about your RTEM program and are familiar with the interactions you or others may have had with NYSERDA over the years as you developed and implemented your RTEM program.

NYSERDA staff (cc'd here) has provided us with your name and contact information. We are hoping you can help us identify the appropriate staff at your organization that can discuss [ConEdison/National Grid] interactions with NYSERDA on the RTEM approach. We expect the discussion to take approximately 30 minutes. If you are the correct person to speak with, please let us know and the best time(s) to speak with you. If not, please let us know who the appropriate person or persons may be to speak with.

Thank you in advance for your support!

Respectfully,

[Signature of the DNV Staff conducting the interview]

Introduction Text

Good afternoon. My name is [NAME]. I am with DNV. Thank you for meeting with us to discuss your interactions with NYSERDA about the RTEM approach.

Introduction and Program Involvement

1. To start with, please state your position/title?
2. Can you briefly explain your involvement with your or [ConEdison/National Grid] RTEM program?
3. How long have you been involved with the [ConEdison/National Grid] RTEM program?

Familiarity and Interactions with NYSERDA RTEM Program

4. Are you familiar with the NYSERDA RTEM program?
5. **[If yes:]** How is your program similar or different from the NYSERDA RTEM program? [**Probe:** Do you fund RTEM system with fault detection diagnostics (FDD) and/or automated system optimization (ASO) features? Do you work with vendors to bring in the participants into the program? Do you cap the incentive in any way?]
6. Thinking back to when the program was first designed:
    a. What were reasons your utility wanted to offer a program like RTEM?
    b. What were the key sources you used to get ideas on how to design the program? [**Probe:** Was NYSERDA's RTEM staff and/or program information one of those sources?]
    c. When did you first start working on it? [**If needed:** We are aware of NYSERDA and ConEdison / National Grid discussions about the NYSERDA RTEM program and approach as far as 2020, Was it 2020 or before?]
    d. When was ConEdison / National Grid aware of the NYSERDA RTEM program?
    e. To what ways did the existence of the NYSERDA RTEM program contribute to your utility company's decision to develop an RTEM program?
7. What interactions did you have with the NYSERDA RTEM staff about their program? [**Probe:** On how they structured the program, eligibility criteria, QA/QC, savings achieved, which vendors were active in the ConEdison / National Grid territory, coordinating vendor recruitment with NYSERDA.]
8. What design ideas did you get from NYSERDA RTEM staff or from reviewing their materials?
9. If there hadn't been a NYSERDA RTEM program, what would have been different about yours? [**Probe:** timing of when you'd offer it, details related to design and implementation, scale of the program]
10. Overall, how influential was NYSERDA RTEM program for [ConEdison / National Grid] designing their own RTEM program? Please answer on a scale from 0-10 where 0= not influential at all and 10= extremely influential.

Indirect Benefits [interviewer note: no program evaluation has been completed, no indirect impacts are claimed]

11. Thinking of your RTEM program, are you claiming any energy savings that are indirectly due to your RTEM program? [**If needed:** As an example, if vendors that you work with sell the systems to nonparticipating sites and you know your program influenced them to do that, do you claim any energy savings from RTEM from those nonparticipant sites? This is analogous to spillover, where program experience led either to additional installations by participating customers at other sites or additional sales by participating vendors to other customers.]

12. [**If they claim indirect savings**:] Can you explain your methodology or share a document describing how you go about estimating those indirect energy savings?

    a. **[If not mentioned:]** What are your pathways of influence that yield indirect program savings – through vendors, through participants, in another way?

13. [**If they claim indirect savings**:] If you can share, how big are your indirect energy savings from your RTEM program compared to your direct savings estimate?

ConEdison / National Grid Program Reach

14. Since the start of your program, how many sites have installed [ConEdison / National Grid] funded RTEM systems? Your best guess is fine.

15. Can you share with us your direct energy savings impacts from those installations? Your best guess is fine or maybe you can point us to an evaluation that has this information.

Wrap Up

16. That was our last question. Is there anything you would like to know from us about our evaluation of the NYSERDA RTEM program?

Appendix G Nonparticipating vendor in-depth interview guide

Memo to: Dana Nilsson, Cody Glavey-Weiss, and Michael Reed; NYSERDA

From: Kora Dreffs, Mersiha McClaren, and Mimi Goldberg; DNV

CC: Maura Nippert; DNV

Date: 4/10/2025

NYSERDA EMTE: Nonparticipating Vendor IDI Guide

Interview Overview

Objective: The purpose of these conversations with nonparticipating (NP) vendors is to identify projects, if any, that were influenced by RTEM but that did not receive a program incentive.

Anticipated timing (interview length): 30-45 minutes

Method of data collection: Phone interview

Table 1 Research Objectives Mapped to Questions in This Instrument

Outputs / Outcomes	Indicators	Benefits	Interview Qs Addressing the Outcome/Indicator And/or Source of Data
Awareness and use of EM technology, and RTEM program	Percent of providers aware of RTEM program resources, programmatic criteria, and standards by providers [added per NYSERDA program staff feedback] Percent of vendor's customers aware of RTEM	Indirect	7 through 14
	Number of EM providers		NYSERDA EM participating and nonparticipating vendor lists and LBNL vendor list
	Percent of offerings with RTEM [added per NYSERDA program staff feedback] Percent of sales of vendor's RTEM products in New York		2 through 6
Demonstrated energy savings/O&M benefits from RTEM activities	Indirect benefits estimate from nonparticipating vendor channel	Indirect benefits	15 (a-d), 16 (a-c)

Interview

Email Interview Invitation Letter

Hi [NONPARTICIPATING VENDOR CONTACT NAME],

NYSERDA would like input from vendors that offer the following building management solutions to commercial customers in New York: An energy building management system(s) with building data collection (sensors, meters, equipment feeds) and data analytics to show building management the actual state of building performance at any point in time.

DNV would like to speak to you, and other vendors like you, about these technologies you may offer. This information will help NYSERDA learn about adoption of these technology in New York since they are looking into this technology as well. We would like to speak with you, or another employee at your organization, who is knowledgeable about your building energy management technology(ies) or products, as well as projects where you may install such systems.

We expect the discussion to take approximately 30-40 minutes. To thank you for your time, we will send you a $250 e-gift card following completion of the conversation.

Please let us know all times when the appropriate contact from your organization is available for a conversation. Below are the options provided by the DNV team (cc'ed) for next week (Eastern):

[DATES AND TIMES]

Thank you in advance for your feedback!

Introduction Text

[INTERVIEWER NOTE: THE QUESTIONS IN THIS INTERVIEW GUIDE SHOULD NOT NECESSARILY BE READ VERBATIM BUT MAY BE MODIFIED TO SUIT THE INTERVIEW]

Hi, my name is [INTERVIEWER NAME], and I'm calling from DNV on behalf of the New York State Energy Research and Development Authority (NYSERDA). As noted in my prior correspondence, NYSERDA would like input from vendors that offer an energy building management system(s) with building data collection (sensors, meters, equipment feeds) and data analytics to show building management the actual state of building performance at any point in time.

We expect this conversation to last approximately one hour, and we are grateful for any amount of time you can spend talking to us. At the completion of this conversation, we will send you a $250 e-gift card to thank you for your time.

I would like to record this call for my note-taking purposes. Do I have your permission? We will keep your responses anonymous and remove any identifying information in our reports.

Introduction and Screening

First, I would like to start by gathering some background information about you and your company.

1. What is your role at your company?
2. We understand you offer building energy management systems and/or service to customers in New York. From your website we see these products: [summarize building energy management products that they offer here]. Do you offer a real time building energy management system, which is the combination of building data collection systems (sensors, meters, equipment feeds) with data analytics and building data information services able to show building operators the actual state of their building performance at any point in time. The system would capture the building data such as set points, power loads, flow rates, temperature or humidity via a building data collection system, and feed the information back to building operators with key insights about operations to help them fine-tune the building and identify capital projects. Does your company offer such product and/or service to commercial customers in New York?

   [Yes – *Proceed with the interview*]

   [No – *Thank them and terminate the interview*] [*Termination script: Thank you for your time. You are not eligible for this interview since we are looking to speak with the companies that sell or offer the real time building energy management technology we just described.*]

   [Don't know – A*sk who else in the company would know, record the contact information, and contact the new contact.*]

3. Does your real time energy building energy management system or product include fault detection diagnostic or FDD?
4. Does your real time energy building energy management system or product include the automated system optimization or ASO?
5. How many employees do you have in New York?
6. What percent of your real time building energy management product sales are in New York?

Awareness of NYSERDA RTEM Program

7. Have you heard of any New York programs that promote real time building energy management technology?
   a. [If yes] Which programs?
8. [*If they have not heard of NYSERDA RTEM program in the prior Q, ask*] NYSERDA offers funding to New York business customers who install real time building energy

management system in their buildings. They call this program the Real Time Energy Management or RTEM program. Have you heard of this program?

9. [*If not heard of NYSERDA RTEM and company applied to be the RTEM vendor in the past but has not passed the application stage since no projects were completed, ask*] NYSERDA records show that your company applied to become NYSERDA's RTEM program vendor in [input YEAR] but have either not followed up with the application or have not completed any projects that received NYSERDA RTEM funding. Are you aware of that? [*If this does not jog their memory of the program, then* a*sk them if they could ask around in the company who is aware of NYSERDA RTEM application/program, and if they could send them a few questions on our behalf via email specific to the NYSERDA RTEM program. Proceed with the interview since we still want to ask them about the utility RTEM programs and questions not related to the NYSERDA RTEM program. After the interview, send them questions we have not asked that relate to NYSERDA RTEM program for them to ask others and pass those answers to us.*]
10. [*If heard of NYSERDA RTEM program*] What have you heard about the NYSERDA RTEM program?
11. [*If they have not heard of ConEd or National Grid RTEM programs in Q6, ask*:] New York utilities offer funding to New York business customers who install real time building energy management system. Have you heard of either ConEdison's or National Grid's real time energy management or RTEM program?
12. [*If heard of utility RTEM program*] What have you heard about either ConEdison's or National Grid's RTEM program?
13. What proportion of your commercial customers in New York are aware of real time building energy management technology?
14. What proportion of your commercial customers in New York specifically ask for the real time energy management technology?

Influence of RTEM Program if Vendors are Aware of Program

15. [*If familiar with NYSERDA RTEM program*]
    a. [*Ask only those who did not apply to become NYSERDA's RTEM vendor*] Our records indicate that you have not worked with NYSERDA RTEM program in the past. NYSERDA RTEM program staff works with vendors to identify customers who are interested and would be eligible for NYSERDA RTEM program funding. NYSERDA prequalifies vendors who offer RTEM technology and service. Has your company considered becoming one of NYSERDA's RTEM participating vendors?
        i. *[if not*] Why not?
        ii. [*If yes*?] Why hasn't your company become a vendor affiliated with the NYSERDA RTEM program?
    b. [*Ask those who did apply to become NYSERDA's RTEM vendor but have not completed a single project through the program*] Our records indicate that your

company applied to become NYSERDA's RTEM program-affiliated vendor in the past. As you likely know, NYSERDA RTEM program staff works with vendors to identify customers who are interested and would be eligible for NYSERDA RTEM program funding. Why haven't your company completed a project through the NYSERDA's RTEM program – a project that would receive NYSERDA's RTEM funding?

c. Before you mentioned hearing the following about the NYSERDA RTEM program: [summarize what they said in Q8 above]. Has this awareness of NYSERDA RTEM program in any way influenced your company's real time building energy management product offerings?

    i. [*If yes*] How?

    ii. [*In not discussed when we asked "How" above,* ***probe***:] How would your offerings (either technologies, services, or cost structures) be different if you hadn't been aware of the NYSERDA RTEM program?

d. [*If applicable, they say NYSERDA RTEM influenced their product offerings in prior Q*] Think of your real time building energy management product offerings that were to some extent influenced by the NYSERDA RTEM program. Since 2020, at how many sites in New York has your company installed such products? Your best estimate is fine.

    i. What was the average square footage for those sites where the system was installed? Your best estimate is fine.

    ii. On average, how many energy savings actions were adopted at those sites where the system was installed?

16. [*If familiar with utility RTEM program*]

a. Are you working with ConEdison's or National Grid's utility RTEM program staff in any way to help your customers obtain real time building energy management utility funding?

    i. *[if not*] Why not?

b. Before you mentioned hearing the following about the utility RTEM program: [summarize what they said in Q10 above]. Has this awareness of utility RTEM program(s) in any way influenced your company's real time building energy management product offerings?

    i. [*If yes*] How?

    ii. [*In not discussed when we asked "How" above,* ***probe***:] How would your offerings (either technologies, services, or cost structures) be different if you hadn't been aware of the utility RTEM program(s)?

c. [*If applicable, they say utility RTEM influenced their product offerings in prior Q*] Think of the real time building energy management product offerings that were to some extent influenced by the utility RTEM program. Since 2020 at how

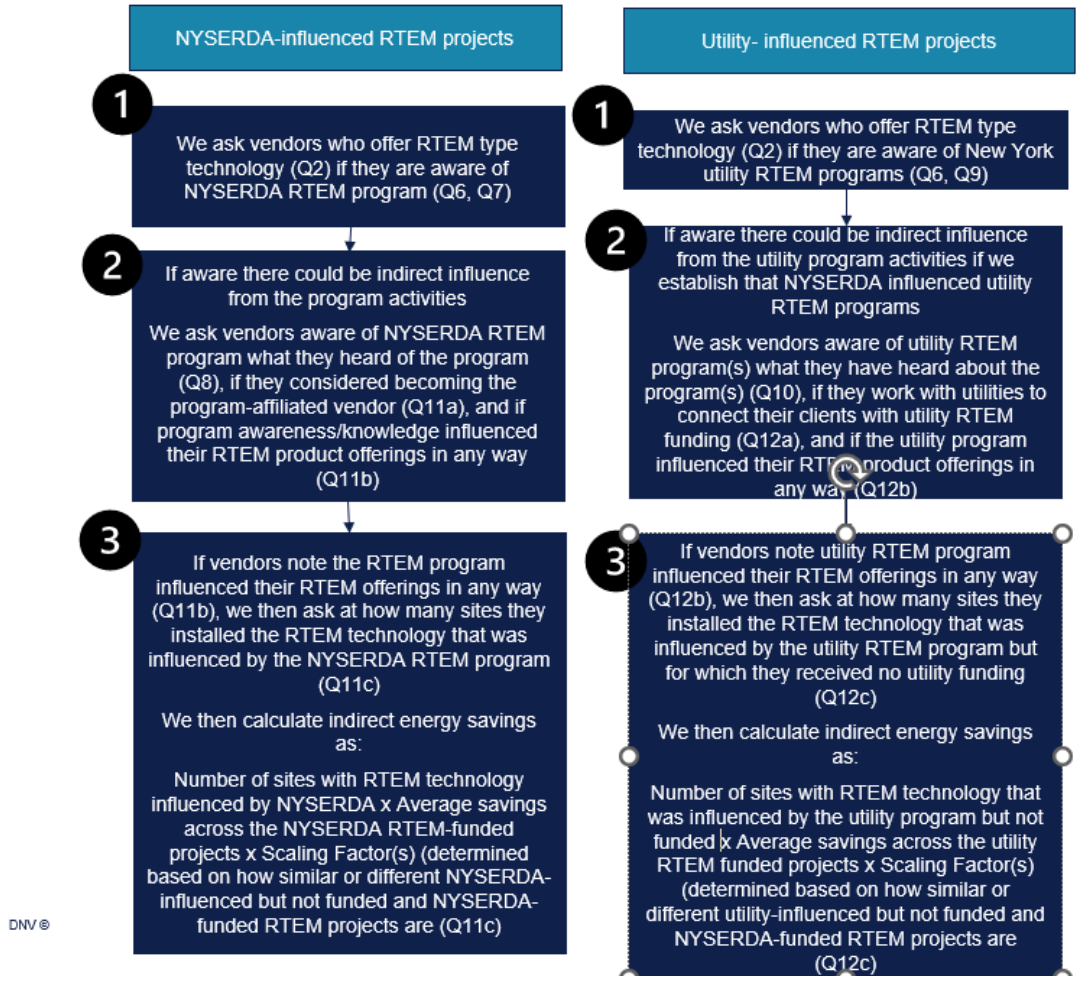
many sites in New York has your company installed such products but without utility funding? Your best estimate is fine.

ii. What was the average square footage for those sites where the system was installed? Your best estimate is fine.

iii. On average, how many energy savings actions were adopted at those sites where the system was installed?

These are all my questions. Thank you for your time.

Below is the graphic that describes how we will use inputs in this guide to develop indirect savings estimates.



Appendix H Selected results from NYSERDA evaluations

The following results from past evaluations are included here to help provide context for the current evaluation.

RTEM system use: Savings by measure type

In the prior evaluation,[38] the evaluation contractor team found evidence that sites installed RTEM systems that were predominantly focused on Controls and Operations and Maintenance (O&M). Capital project implementation was not observed for a large number of sites, which is counter to early program assumptions that the RTEM program would lead to large capital projects at participating sites. This mismatch in program assumptions has the effect of depressing the direct benefits realization rate.

Figure H-1 and Figure H-2 compare installed and not-installed electric energy savings by measure type.

Figure H-1. Installed electric savings by measure-type

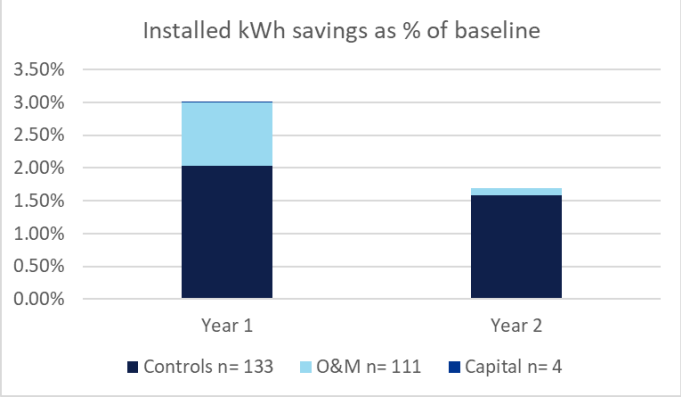
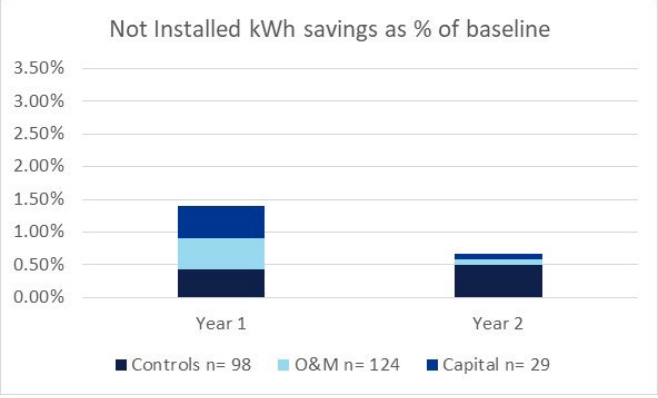


Figure H-2. Not installed electric savings by measure-type



[38] DNV, *Clean Energy Fund Commercial Chapter Impact Evaluation Real Time Energy Management (RTEM) Program (2017 – Q4 2021) Final Report*. September 2023. Prepared for NYSERDA. https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/PPSER/Program-Evaluation/2023-09-22-Matter-No-16-02180-NYSERDA-CEF-RTEM-Phase-III-Impact-Report.pdf

Similarly, Figure H-3 and Figure H-4 compare installed and not installed heating fuel energy savings by measure type.

Figure H-3. Installed fuel savings by measure-type

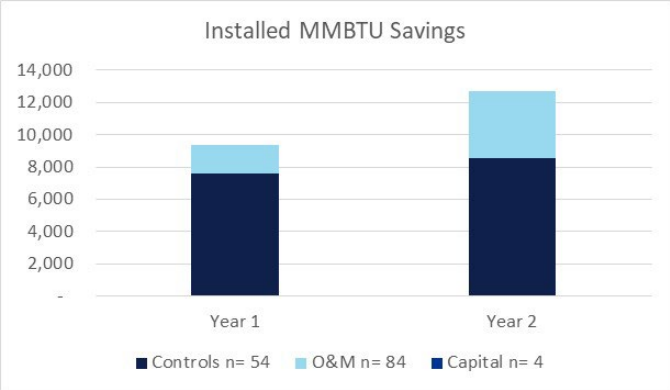


Figure H-4. Not installed fuel savings by measure-type