From Distributed Spreadsheets to One Platform: Digitizing SEM Delivery While Maintaining Performance and Participant Experience

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ABSTRACT

Electricity and natural gas costs for commercial and industrial customers continue to rise, increasing pressure on utilities and program administrators to deliver cost-effective energy efficiency at scale. Strategic Energy Management (SEM) programs are designed to generate persistent energy savings by supporting organizations in continually improving energy performance through operational engagement, data-driven performance tracking, and ongoing project implementation. As SEM participation increases, administrative and analytical complexity required to deliver and administer the program grows with it, often at an accelerated rate. Energy Trust of Oregon's SEM programs expanded significantly under a spreadsheet-based model. By 2021, more than 700 independent site-level models were in use across cohorts. In 2022, they initiated migration to a centralized, cloud-based Energy Performance Platform designed to standardize modeling workflows, improve documentation consistency, and enable portfolio-level visibility. This paper examines program outcomes before and after full platform implementation, focusing on evaluated realization rates, participation scale, customer satisfaction, and operational shifts. Across the period spanning full implementation, electric realization rose from 90% to 100% and natural gas realization rose from 56% to 100% in the Energy Trust Existing Buildings SEM programs, while the program replaced more than 700 independent spreadsheet models. Program growth increased more proportionally than program costs, and the platform created centralized access to 177 previous site opportunity registers while maintaining high satisfaction among program participants.

INTRODUCTION

Rising electricity and natural gas costs for commercial and industrial customers are intensifying pressure on utilities and program administrators to deliver cost-effective energy efficiency at scale. Strategic Energy Management (SEM) programs are designed to generate persistent energy savings by supporting organizations in continually improving energy performance through operational engagement, data-driven performance tracking, and ongoing project implementation. SEM programs rely heavily on participant engagement and organizational learning. Program implementers work directly with facility staff to build internal energy management capability, identify operational improvements, and support implementation of energy-saving projects. Over time, participants develop the skills and processes needed to continuously manage energy performance beyond the duration of the program. Unlike one-time

CapEx measures, SEM often requires sustained performance tracking and documentation across years of the program, increasing administrative complexity as participation grows.

As SEM participation increases, administrative and analytical complexity required to deliver and administer the program grows with it, often at an accelerated rate. Each site requires individualized baseline development, reporting-period modeling, treatment of capital impacts, and sufficient documentation to withstand scrutiny. Historically, many SEM programs have relied on distributed spreadsheet-based performance tracking tools independently maintained by implementers. While flexible, this approach can introduce variability in modeling structure, documentation practices, and version control; particularly at scale.

Energy Trust of Oregon's SEM programs expanded significantly under a similar spreadsheet-based model. By 2021, more than 700 of these independent site-level models were in use across cohorts. In 2022, they initiated migration to a centralized, cloud-based Energy Performance Platform (EPP) designed to standardize modeling workflows, improve documentation consistency and security posture, eliminate version control issues, and enable portfolio-level visibility. By 2023, the platform was fully implemented across Energy Trust's participating commercial and industrial sites. As SEM programs expand across utilities, many face similar structural challenges associated with managing hundreds of site-level regression models, documentation artifacts, and program records across multiple implementers and years of participation. While SEM methodologies have matured, the infrastructure used to administer these programs has often remained fragmented and manually managed. Understanding how centralized digital infrastructure affects program performance and scalability is therefore increasingly relevant for utilities seeking to expand SEM portfolios while maintaining evaluation integrity.

This paper examines the program outcomes before and after full platform implementation:

- Did evaluated realization rates change following implementation?
- Did SEM participation scale during the same period?
- Did Customer satisfaction remain high?
- What operational shifts accompanied digitization?

BACKGROUND

SEM savings estimation depends on consistent regression modeling, clear baseline definition, accurate documentation of capital measures, and structured treatment of non-routine events. Prior impact evaluations of Energy Trust's SEM programs identified recurring challenges, including (DNV GL 2016):

- Variability in baseline model structure
- Inconsistent documentation of Non-routine Events (NREs)
- Treatment of non-SEM capital measures
- Model uncertainty (fractional savings uncertainty)
- Complexity in reconstructing site-level logic during evaluation

Under the spreadsheet-based delivery model, each participating site maintained an independent regression model. Because of this, customer-focused portfolio-level visibility required manual aggregation, which was not always possible. Version control relied primarily on local file management practices, and evaluation often required reconstructing modeling decisions from individual spreadsheets.

Although spreadsheet-based tools had low direct software costs, they created indirect costs through manual aggregation, quality control, version management, evaluation support, and coordination across delivery teams. From the program perspective, the cost comparison was not simply paid software versus “free” spreadsheets. It included the embedded labor and risk costs associated with data sharing, inconsistent file management, version control, uneven documentation practices, and limited customer-facing usability. In addition, the platform was not developed entirely from scratch for this transition; it already existed as an operational software-as-a-service product with secure infrastructure, core functionality, support processes, and a software delivery team in place. The incremental program cost was therefore primarily associated with configuration, customization, feature development, onboarding, and ongoing licensing and support. The transition shifted delivery from distributed manual effort toward centralized infrastructure designed to improve consistency, security, portfolio visibility, and usability across customer organizations.

Based on prior impact evaluation reports, reconstructing modeling assumptions and site-level logic from distributed spreadsheets often required substantial clarification between evaluators and program implementers (DNV GL 2016).

Centralizing modeling workflows and documentation within the Energy Performance Platform provides clearer audit trails for regression models, non-routine events, and project impacts, improving traceability and reducing the need for manual reconstruction during evaluation.

In response to growing program complexity, Energy Trust began considering a transition toward centralized digital infrastructure. The COVID-19 pandemic in 2020 further exposed the sensitivity of regression-based SEM modeling to consistent baseline and reporting definitions. Given documented methodological disruptions during that year, 2020 is excluded from baseline comparisons in this analysis.

PROGRAM DESCRIPTION

In 2022, Energy Trust began migrating SEM delivery from distributed spreadsheets to a centralized Energy Performance Platform (EPP). The transition aimed to standardize regression modeling structure, reduce variability across cohorts while maintaining established measurement and verification (M&V) methodology, and provide consistent customer experience across delivery teams.

Prior to migration:

- Over 700 independent spreadsheet models were maintained
- Model logic and documentation varied across files and delivery teams
- Manual aggregation was required for portfolio reporting
- SEM opportunities were tracked separately in site-level "opportunity registers," disconnected from regression models

Under the spreadsheet-based model, SEM project tracking and performance modeling existed in parallel systems. While regression models estimated overall energy performance, opportunity registers tracked identified operational and capital improvements. Linking implemented projects to the observed changes in energy consumption often required manual interpretation and cross-referencing.

The Energy Performance Platform introduced:

- Standardized regression templates
- Structured documentation fields
- Centralized NRE logging
- Unified capital impact tracking, enabling customers to document both SEM opportunities and other projects that influence modeled energy performance.
- Integrated project and opportunity tracking
- Automated or structured data ingestion
- Portfolio-level dashboards

Within the platform, each SEM project identified through coaching engagements is tracked from identification through implementation and verification. Projects include associated estimated savings, implementation status, and a defined persistence strategy. Persistence strategies document the operational controls, monitoring processes, and ownership structures intended to ensure that energy performance improvements are maintained during and after formal program engagement.

By embedding project tracking and persistence documentation directly alongside regression-based performance data, the platform enables program staff to view implemented opportunities in context with modeled energy consumption trends. This integration supports clearer linkage between operational changes and observed energy performance and provides structured documentation to support evaluation and long-term savings persistence.

Migration occurred throughout 2022, and by 2023 the platform was fully implemented across Energy Trust's Existing Buildings (EB) and Production Efficiency (PE) SEM programs.

Importantly, evaluation methodology did not change, and regression-based savings estimation remained consistent with prior M&V practices. The intervention standardized implementation and documentation while preserving the existing savings methodology.

METHODOLOGY

COMPARISON YEARS

Existing Buildings SEM.

- Baseline: 2021 (spreadsheet-based) (SBW Consulting 2023)
- Post-implementation: 2023 (fully digital) (Opinion Dynamics 2025)

Production Efficiency SEM.

- Baseline: 2018–2019 evaluation results (spreadsheet-based)[1] (Cadmus 2021)
- Post-implementation: 2023 (fully digital) (Cadmus 2025)

Metrics Examined.

Realization rate is a typical evaluation metric in energy efficiency program evaluation, measurement, and verification (EM&V) that compares independently evaluated savings to the savings originally estimated, claimed, or tracked by the program. A realization rate near 100% indicates that evaluated savings closely align with claimed savings. In this analysis, realization rates are used as an indicator of whether savings verification quality was maintained during a major system transition. This is important because the platform changed how SEM teams and participants interacted with models, project lists, documentation, and performance data, while the underlying M&V methodology remained consistent.

- Realization rates (electric and natural gas)
- SEM participation and satisfaction (active sites)
- Operational indicators (staffing, onboarding, administrative effort and delivery fees per site)
- This analysis is observational; therefore, it does not isolate the platform as the sole causal driver.

RESULTS

REALIZATION RATES

Existing buildings SEM.

Electric realization:

- 2021 Electric Realization: 90%
- 2023 Electric Realization: 100%
- Change: +10 percentage points

Natural gas realization:

- 2021 Gas Realization: 56%
- 2023 Gas Realization: 100%
- Change: +44 percentage points

Across the period spanning full implementation of the Energy Performance Platform, electric realization rose from 90% in 2021 to 100% in 2023, while natural gas realization rose from 56% to 100% (SBW Consulting 2023, 48; Opinion Dynamics 2025, 8).[2] Since the program

[1] The 2020 program year is excluded due to documented COVID-related modeling disruptions.
[2] The 2021 SEM gas figure reflects the Performance Tracking Tool (PTT) modeling method, which the evaluator adopted as the final evaluated result. Because of COVID-era disruptions, 2021 SEM savings were claimed using the alternative Savings Rate Table (SRT) method, which evaluated to 98% for gas. The evaluator reported the PTT-based gas realization rate at low precision (85.1% relative precision at 90%

transitioned to using the EPP in 2023, these results are consistent with savings estimates remaining accurate or improving as the program transitioned to a centralized digital platform.

Production efficiency SEM.

Production Efficiency realization rates, 2018–2019 baseline through 2023:

- 2018 Electric Realization: 99%
- 2019 Electric Realization: 97%
- 2022 Electric Realization: 98%
- 2023 Electric Realization: 99%

Natural gas realization rates remained high:

- 2018 Gas Realization: 100%
- 2019 Gas Realization: 100%
- 2022 Gas Realization: 100%
- 2023 Gas Realization: 100%

Production Efficiency realization rates remained consistently high throughout evaluation years. Electric realization ranged between 97% and 99% across the evaluated period, while natural gas realization remained at or near 100% (Cadmus 2021, 3; 2024, 3; 2025, 3–4). These results suggest that program expansion during this period did not negatively affect evaluation accuracy or savings verification quality. While the development and launch of EPP took care to consider the program modeling and M&V requirements, with large program shifts and growth it is prudent to verify that there are no negative impacts to the quality of savings. Impact evaluations are completed routinely to provide accountability and verify the savings results we claim.

PARTICIPATION

EXISTING BUILDINGS (COMMERCIAL) SITES AND ENGAGEMENTS

Participation and engagement metrics are derived from internal Energy Trust delivery reports compiled annually by program teams. Program years 2021 through 2025 were selected to review because of the general alignment with the completed impact evaluations, as well as the ability to track programs' growth and evolution within relatively consistent delivery frameworks. Program year 2021 represents a level of program participation consistent with those seen prior to 2020, while also capturing many of the newly introduced program delivery structures (e.g. virtual workshops). Additionally, this timeframe includes program delivery data prior to the expansion of the EB SEM program to include multifamily housing participants.

Table 1. Commercial Sites

confidence), reflecting high site-level scatter rather than a deficiency in the modeling method. The program returned to modeled-savings M&V in 2023 (SBW Consulting 2023, 9–10, 48).

Year	Commercial Sites
2021	494
2022	567
2023	631
2024	715
2025	871

Table 2. Commercial Engagements

Year	Commercial Engagements
2021	80
2022	83
2023	113
2024	116
2025	130

Participation increased substantially during the study period, reflecting expanded SEM recruitment, eligibility and program scale.

SEM participant sites remain on the platform after program engagement to support ongoing evaluation and persistence analysis. As a result, the increase in growth reflects all participating facilities tracked within the program infrastructure rather than only newly enrolled sites in a given year.

PRODUCTION EFFICIENCY SITES AND ENGAGEMENTS

Participation and engagement metrics are derived from internal Energy Trust delivery reports compiled annually by program teams.

Table 3. Industrial Engagements/Sites

Year	Industrial Engagements/Sites
2021	48
2022	52
2023	50
2024	72
2025	47
2026[3]	61

Participation growth during this period represents the program's most rapid expansion to date. Participation is driven by many factors, including recruitment success and market interest. Delivery constraints (including budget, team capacity, and customer baseload) are considered when programs approve enrollment in the programs.

OPERATIONAL INDICATORS

[3] Includes sites that will complete in November of 2026 whose engagements are included in the costs outlined in Table 3

In addition to realization and participation metrics, operational indicators were examined to understand whether program scale required proportional increases in delivery resources. Delivery costs are derived from internal Energy Trust delivery reports compiled annually by program teams and reflect both program growth and evolution over time.

In the Existing Building SEM Program, customers can choose to enroll a number of individual sites. Table 4 shows the percent change in each site (individual location, e.g. Elementary School) and SEM engagement (customer, e.g. School District) for each program year for the Existing Building SEM Program. Table 5 shows the corresponding percent change in coaching fees on a per site and a per engagement basis for the Existing Building SEM Program.

Table 4. EB Site and Engagement Variance

Year	EB Site Variance	EB Engagement Variance
2021-2022	13%	4%
2022-2023	10%	27%
2023-2024	11%	3%
2024-2025	17%	11%

The delivery of SEM is paid for through utility incentives, representing coaching service that customers receive through Energy Trust. As such, the cost to deliver SEM is tracked carefully and is referred to throughout this report as “coaching fees,” representing the dollar amount associated with delivering SEM. The values included in Table 5 and 6 are derived from internal program reports comparing the change in sites and/or engagements, to the change in cost of delivering SEM on an individual site and/or engagement from year to year. Components of delivering SEM remained consistent during these years and are listed below:

- Monthly Coaching Calls
- Workshop Delivery
- Treasure Hunts
- Energy Maps
- Energy Management Assessments
- Energy Modeling

Table 5. EB Coaching Fee Variance

Year	EB Coaching Fees/Site Variance	EB Coaching Fee/Engagement Variance
2021-2022	4%	14%
2022-2023	4%	-18%
2023-2024	-1%	9%
2024-2025	9%	16%

In the Production Efficiency SEM Program, customers are enrolled at a site level. Therefore, there is no distinction between a site and an engagement. Table 6 shows the percent change in both the engagements and corresponding per engagement coaching fees.

Table 6. PE Engagement and Fee Variance

Year	PE Engagement Variance	PE Coaching Fee/Engagement Variance
2021-2022	8%	-38%
2022-2023	-4%	19%
2023-2024	31%	8%
2024-2025	-53%	-18%
2025-2026	23%	21%

To better visualize the change in delivery costs, the following tables show the change in costs between pre-EPP implementation and current delivery costs.

Table 7. 2021-2025 EB Summary

Metric	Variance
Coaching Fees Variance	52%
Commercial Site Variance	43%
Commercial Fees/Site Variance	22%
Commercial Engagement Variance	38%
Coaching Fee/Engagement Variance	16%

Table 8. 2021-2026 PE Summary

Metric	Variance
Coaching Fees Variance	25%
Site Variance	21%
Coaching Fees/Site Variance	4%

Table 7 shows that while the total coaching fees in EB increased by 52% between 2021 and 2025 and the total increase between sites and engagements between 2021 and 2025 was 43% and 38%, respectively. However, the coaching fees per site and per engagement increased only 22% and 16%, respectively.

For Production Efficiency, the coaching fees increased 25% from 2021 to 2026, while the total sites increased by 21%. However, the coaching fees per site only increased 4% from 2021 to 2026.

The comparison of total coaching fee growth to per-site and per-engagement cost growth shows that while the overall cost to deliver the programs increased, the overall cost per site and the cost per engagement did not increase at the same rate. Stated another way, the programs were supporting more sites and engagements while the unit cost of delivery, measured as coaching fees per site or per engagement, increased more slowly than overall program volume. This suggests improved scalability of delivery processes and potential for even further program evolution.

Operational indicators show year-to-year variation in both engagement levels and coaching fees. Some of this variation is a reflection of changes in recruitment criteria and goals, as well as continued program evolution. Despite these fluctuations, realization performance remained stable, indicating that these adjustments did not negatively affect savings verification outcomes.

PE SEM delivery was streamlined both to accommodate smaller customers and to allow larger cohorts, such as the one seen in 2024 to move through the program into later years, not only without increasing delivery cost proportionally but also showing efficiency in documentation and delivery enabled by the use of EPP.

Qualitative reporting for both programs indicates reduced time spent on spreadsheet version control, manual aggregation, and reconciliation for delivery of SEM, along with increased focus on participant engagement and opportunity development. Many components of program delivery have also seen improvements in manual aggregation and improved delivery efficiencies, such as program support for impact evaluation and program evolution to support customers after or instead of SEM.

Recent participants reported high levels of overall satisfaction with the program experience. Process evaluation findings completed in 2026 indicate strong participant satisfaction with SEM program delivery (Evergreen Economics 2026), including the ease of use of the EPP. Interviews with participants completed as part of a process evaluation examining the program transition to the platform found that customers reported the platform easy to use and the majority of participants rated the ease of use highly (Evergreen Economics and SBW Consulting 2025). Additionally, overall program satisfaction with recent customers remained high with more than half of customers being "highly satisfied" and almost all customers being "Very or Extremely" satisfied (Evergreen Economics 2026). Internal program surveys in 2025 showed similar themes, with several participants who experienced the program under both methodologies noting it was "easier to use and [allowed] multiple contributors."

Between 2021 and 2025, the EPP infrastructure provided capacity for growing SEM programs and added a new ability to access and analyze previous participants' uncompleted projects, with centralized storage and easy access to 177 sites' opportunity registers.

There are changes in additional internal operational processes that are not supported by this platform, and those changes and efficiencies are still in progress.

DISCUSSION

The realization rates observed across this period occurred alongside substantial participation and program growth. Maintaining or improving realization rates while expanding the number of sites suggests that digitization did not dilute program rigor.

Transitioning from more than 700 distributed spreadsheet models to a centralized system reduced model fragmentation and standardized regression structures across cohorts. Standardization reduced variability in NRE documentation, contributing to more realization stability.

This analysis is observational and does not isolate the Energy Performance Platform as the sole causal driver of these outcomes; recruitment strategies, participant mix, and staff and participant experience all evolved alongside the platform transition. A quasi-experimental design, such as difference-in-differences analysis against a comparison cohort that did not transition platforms was not feasible; the platform was deployed program-wide, and ongoing curriculum evolution and programs' commitment to a consistent customer experience across the service territory left no untreated cohort to serve as a comparison. However, two things did not change during this period. First, the technical Measurement and Verification standards and guidelines for savings claimed through both the industrial and commercial SEM programs remained consistent year over year, even as programmatic and delivery elements evolved. Second, the independent impact evaluations were conducted to a consistently high level of rigor and scoped consistently from year to year. Because neither the savings methodology nor the evaluation approach changed, we have high confidence that the maintenance or improvement in evaluated realization reflects real performance rather than an artifact of changed measurement or evaluation approach.

The integration of project-level persistence strategies within the centralized platform may also contribute to sustained realization of performance by formalizing operational controls and ownership structures for implemented improvements.

The centralized infrastructure also reduced administrative burden associated with spreadsheet exchange and manual aggregation. By consolidating modeling, documentation, and reporting on a unified platform, program delivery staff could shift effort toward higher-value activities such as identifying engagement and savings opportunities. Additionally, some program documentation could be streamlined due to consistency within the centralized platform. Centralized digital infrastructure also enabled programmatic improvements in delivery processes and data management that supported SEM expansion while maintaining high realization performance.

The growth in participation during this period suggests that centralized digital infrastructure enabled programmatic improvements that supported SEM delivery at a larger scale. Delivery costs increased at a slower proportional rate than program growth, which suggests improved scalability of program delivery.

The centralized and easily accessible nature of the Energy Performance Platform also enabled programmatic improvements in delivery processes that contributed to these efficiencies. In the Production Efficiency program, some workflow improvements related to generating and displaying savings continue to evolve as additional platform functionality and program adjustments are implemented. In the Existing Buildings program, an important aspect of the transition involved separating time spent on direct customer engagement from program management activities such as forecasting, budgeting, and reporting. These structural changes, while still in progress, combined with centralized infrastructure, are contributing to improved delivery efficiency while maintaining program rigor and customer satisfaction.

Further program improvements to leverage efficiencies for program management are being explored. 2026 SEM process evaluation findings similarly highlight the importance of improving data integration and project tracking tools to reduce participant burden and improve data quality (Evergreen Economics 2026).

The process evaluation findings also identified challenges related to collecting and managing energy data across program systems, reinforcing the importance of improved data infrastructure for SEM delivery (Evergreen Economics 2026).

Centralized infrastructure also created conditions for further digital enhancements. With unified data and standardized modeling, utilities can leverage analytics and AI-enabled targeting to support participant recruitment and adoption measurement. While such capabilities extend beyond the scope of this analysis, the foundational infrastructure described here enables such scalable digital engagement strategies.

Limitations include potential concurrent program changes, market conditions, and participant mix effects.

CONCLUSIONS

Across the period spanning full implementation of a centralized Energy Performance Platform, Energy Trust of Oregon's SEM programs showed the following:

- Electric realization rose from 90% to 100% in the Existing Buildings program
- Natural gas realization rose from 56% to 100% in the Existing Buildings program
- Replacement of more than 700 independent spreadsheet models
- Increased proportional program growth versus program costs
- Centralized, easy access to 177 previous site opportunity registers
- Maintained high customer satisfaction

These findings suggest that digitizing SEM delivery through standardized infrastructure can coincide with improved realization performance, maintained or improved customer satisfaction, and rapid program scale. Rather than replacing an established M&V methodology, digital infrastructure standardized its implementation. As utilities pursue increasingly ambitious efficiency targets, centralized digital systems may serve as an enabling layer that supports scale, transparency, and integrity of evaluations.

Future research should examine long-term persistence, cost-per-participant trends, participant satisfaction, and multi-year evaluation stability under centralized delivery models.

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