



Agile Evaluation for SEM and Performance-Based Programs: Increasing Certainty and Program Uptake and Decreasing Risk

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For over four years, Rouj Energy Analytics (Rouj) has been working as an agile, embedded evaluator on commercial and industrial Strategic Energy Management (SEM) and performance-based programs. The primary program implementer involved Rouj in the program to oversee the measurement and verification (M&V) and the data analytics. This included building and reviewing regression models and assisting in documenting performance during the program period. The implementer conducted several SEM-related trainings and site visits during the program, and SEM progress was tracked monthly, using site-specific regression models and a custom-built performance tracking tool. Rouj's involvement as an embedded evaluator allowed the program to catch issues in models in real time, as well as to make better supported non-routine adjustments. Through detailed analysis of data sources and review of both energy and non-energy related events that occurred in the program year, Rouj was able to find further opportunities to save more energy, improve the resolution and accuracy of the models used, and increase reported savings in some instances. Rouj also increased transparency of the reported energy savings by clearly documenting assumptions, and stating and acknowledging uncertainties found in the models. This increase in modeling support allowed Rouj to improve both performance and participation in the program and drove additional participants to the program as referrals from current participants. In Rouj's role as a behind-the-scenes implementer, leveraging our process and impact evaluation experience, we observed that program participation and how deeply the customer is engaged with the program seemed to have a very direct correlation to energy savings achieved, as model inputs and ongoing performance tracking required direct contact with participants.

One industrial SEM program included some of the largest, most complex manufacturing facilities in North America. The program aimed to identify opportunities for Operational, Maintenance and Behavioral (OM&B) changes that can result in electricity and gas savings, GHG emissions reduction, and other nonenergy benefits on site. These provided the participating facilities with the training and tools needed to track their savings benefits. Electricity and gas savings were quantified using multi-variable regression models and SEM performance was tracked monthly at each site. While projects were not incentivized to participate in the program, the program support (site visits, performance tracking model development, and trainings) were all provided free to participants. As a result of utility and customer satisfaction with the program and realized savings the program was later expanded to include school districts. While it is a known fact that engaged customers typically result in higher energy savings, we found that a root cause was likely related to the incentive structure of the program. In this SEM program, participants were provided free services, but not incentives, to participate in the program. In many other SEM programs, participants are paid based on kWh savings achieved, which definitely helps to improve engagement, but in a more indirect way. However, while incentives per kWh does provide an incentive to save energy, it is still often a risky balance for the 'energy champion' to stay engaged with competing operational priorities, particularly when their primary role in the facility is not saving energy.

In another performance-based SEM program targeting school districts including kindergarten through high school buildings, technical facilities and administrative buildings, the implementer conducted several SEM-

related trainings and site visits during the program. SEM progress was tracked monthly, using a school-specific regression performance tracking tool. Annual electricity savings were reported at both the district level and building level. As for the industrial program the embedded support allowed us to improve both performance and participation in the program and drove additional schools to the program as referrals from current participants. Our experience as a third-party embedded M&V contractor in this School SEM program gave us insights regarding the timing of when an embedded M&V contractor should be involved, what types of roles they fill in the program and a detailed look, both qualitative and quantitative, into the benefits and hurdles of embedded M&V approaches.

Results

We found that the behavioral interventions among Industrial and Institutional (Schools) customers that most likely lead to verifiable savings were :

- “Turn it Off” awareness campaigns presented to all on site staff. These can also include posting signs, reminders, and even holding regular staff meetings or competitions to encourage energy awareness.
- Workshops or webinars on specific energy savings topics for specific, common equipment types aimed at empowering facility and operating staff with the knowledge they need to improve operations, using data and tools they already have. Some successful workshops we’ve seen include the following topics: Energy and process mapping; Utilizing energy or facility monitoring and controls system; Optimizing variable frequency drives (VFDs) on fans and pumps; Compressed air system optimization; Refrigeration system optimization; Boiler optimization and economizers; Steam leaks; Piping insulation; Chilled water system controls opportunities; and Compressed air leak detection and repair.
- We saw several projects achieve savings from subtle setpoint changes to chilled water, hot water and cooling tower water temperatures. This has really had success with facility staff, when they can directly see the impacts. For example, if they have power (kW) meters on chillers, they can increase their chilled water temperature by 0.5 or 1.0°F, wait to see how/if it impacts operations and measure the pre and post energy usage at the equipment level in a relatively short time period. The number one priority for facility staff is to keep the plant running, not saving energy, but if you can take small steps and measure impacts directly, it often provides facility staff with the confidence they need to try additional adjustments.
- We detected several air compressor leaks through identifying data anomalies that the facility manager was unaware of. Repairing the air leakage resulted in significant savings.
- In the school program, we found that several projects installed a building management system (BMS) through a capital incentive program at the same time they participated in SEM. These sites generally became more engaged and saw higher savings, beyond their capital improvement BMS savings, through participation in the SEM program. This was likely because facility staff not only installed a BMS, but also received regular training on how to identify savings opportunities in the SEM program and utilized the BMS during SEM.