Leaving the Rearview Mirror Behind: Assessing the Effectiveness of a Concurrent Impact Evaluation Process

Betsy Ricker and Nick Collins, ERS, and Cheryl Glanton and Carley Murray, NYSERDA

ABSTRACT

A traditional post-installation impact evaluation of industrial energy efficiency programs is conducted several years after the completion of energy projects. Because this rearview mirror approach has its limitations, such as missed opportunities for pre-installation metering and baseline definition, the New York State Energy Research and Development Authority (NYSERDA) Industrial and Process Efficiency (IPE) program has implemented a unique concurrent evaluation process in which impact evaluators work alongside program implementers on the largest and most complex projects in real time. In general, projects chosen for this process have large preliminary savings estimates and complicated baselines. This often means the selected projects have the highest risk of differences between projected and realized savings. The concurrent review process seeks to reduce this risk by including evaluator input on key issues throughout the project life cycle – from incentive commitment to final reported savings. Concurrent evaluation also benefits the program and evaluation process by requiring fewer touch points for the customers while improving engineering rigor and quality.

This paper assesses the effectiveness of the concurrent evaluation process through the lens of a recently completed impact evaluation of NYSERDA's IPE program. It builds on previous work summarizing the early lessons learned through the concurrent evaluation process and discusses how these changes have improved process efficiency. The paper also provides implementer and evaluator perspectives on the concurrent review process itself, its mission, its impact on the realization of industrial energy efficiency savings in New York State, and its applicability to other programs and jurisdictions.

Industrial and Process Efficiency (IPE) Program Description

NYSERDA's Industrial and Process Efficiency (IPE) Program provides technical assistance and installation incentives to manufacturing, agricultural, mining, wastewater, and data center customers. Incentives are available for the implementation of both electric and natural gas projects that include custom and site-specific commercially available energy efficient technologies. Both existing and new facilities are eligible to participate in the IPE program.

The program employs technical reviewers who review and generate savings estimates for each project that is encumbered by the program. These technical reviewers are engineers and energy managers who work with customers and NYSERDA's program managers to ensure that accurate project savings and incentives are calculated using the best available information. The program's typical IPE project flow and savings calculation process is outlined in Figure 1.

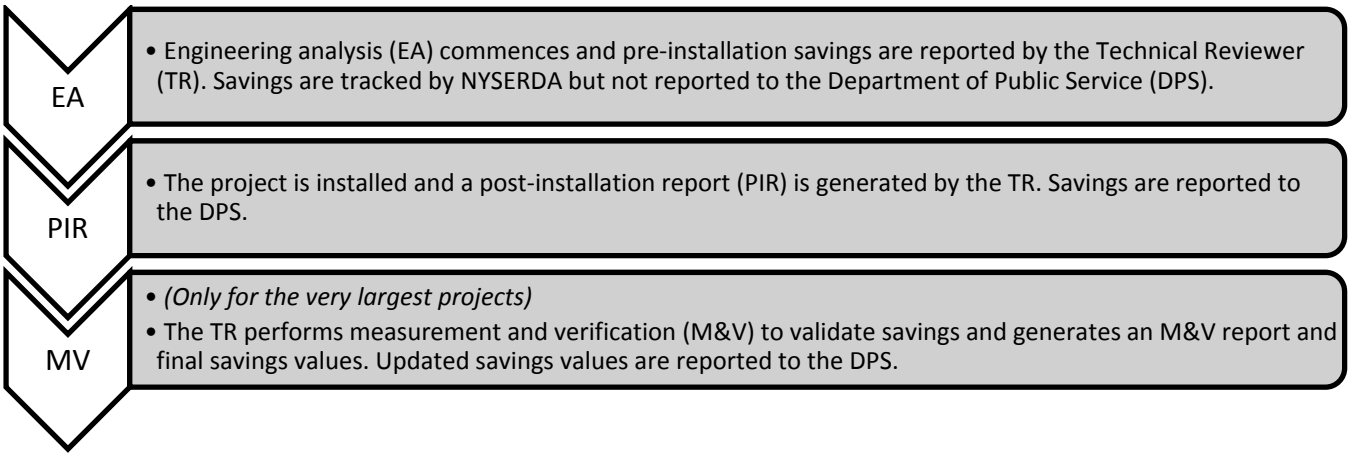

Figure 1. Typical Steps in the IPE Program Project Review Process

As shown in Figure 1, there are up to three savings estimates (engineering analysis (EA), post-installation review (PIR), and M&V issued by the technical reviewers for each project. All projects are subject to pre- and post-installation savings estimates and, to ensure that the program is garnering expected savings, the IPE program implements its own measurement and verification (M&V) process on projects with especially large savings[1]. The M&V process typically includes the in situ measurement of operating equipment through facility data acquisition systems or TR-installed metering equipment for 3 to 12 months. Though it is not required by the program, the M&V methods employed by the TR often align with the process described in the International Performance Measurement and Verification Protocol (IPMVP).

Since its inception in 2009, the IPE program has received applications for more than 1,300 projects and has reported more than 600,000 MWh/yr in electric energy and 1.8 million MMBtu/yr in natural gas savings to the DPS. Of the projects incented by the program, more than 190 received program-required M&V. In total, almost 60% of the annual kWh and 55% of the annual natural gas savings reported by the IPE program to date have required program-implemented M&V. On average, the program's M&V process results in a 2% downward adjustment in annual kWh savings and a 23% upward adjustment in annual natural gas savings when compared to the savings estimated at the PIR stage.

Concurrent Evaluation Background

The initial IPE program goal was to save 800,000 MWh of energy by 2015. In order to meet this aggressive goal, the program team focused on attracting large, complex improvement projects into the program. To mitigate the potential for deviations between reported and evaluated savings, the evaluation and program teams started working side-by-side to review the biggest projects (>5,000,000 kWh/yr of electricity and/or > 20,000 MMBtu/yr of natural gas savings) earlier in the project development cycle. In 2011, after its first 2 years of operation, the IPE program received a conventional retrospective impact evaluation. The results were favorable[2], but it was clear that projects were growing in complexity and size, increasing the potential for more dramatic differences between program-reported and evaluated savings in the future. Gradually, the concurrent evaluation approach was formalized with three goals:

1. Review the program's pre- and post-retrofit measurement plans and identify any evaluation-driven need for additional data collection that the program is not already performing. The

[1] Projects with savings in excess of 500,000 kWh or 10,000 MMBtu are subject to Program M&V.

[2]The evaluated savings realization rate was 1.01 on electric energy savings and 1.14 on natural gas savings. The electric energy savings error ratio was 0.33 (Megdal Team, 2012).

evaluators will either perform the additional data collection or have the applicant do so to ensure that the evaluators can calculate energy impacts.

2. Give the evaluators the opportunity to review and comment on the program baseline characterization as early as possible.
3. Review the program administrator's savings calculations and assumptions for reasonableness and provide feedback.

Thoughtful discussion and resolution of differences is a core component of this review process and typically results in the program and evaluation perspectives converging on a mutually agreed-upon solution; the program is not mandated to adopt the concurrent evaluator review recommendations, however. Additionally, should a project that undergoes concurrent review be included in the sample of a future retrospective evaluation, the evaluators will commit to the baseline equipment characterization they previously established, but changes in site operations, differences in evaluation contractor perspectives, or other factors may result in different evaluated post-installation savings estimates.

Concurrent Evaluation Process

The review process is constantly evolving to meet the challenges of providing real-time feedback to program staff. As originally conceived, the process was intended to include only pre-installation project reviews and evaluator involvement to identify and obtain the data evaluators would need for the evaluation of the project. However, as a greater number of reviews were performed, it became clear that for particularly complex projects, reviewing and characterizing the baseline for the projects was also important. And where evaluators had significant baseline and M&V recommendations, it was necessary to include evaluation review of the program's final M&V to verify that the evaluators' recommendations were adopted as intended and to provide explanation and documentation on any deviations between the program and evaluator findings on the project.

As currently implemented, the concurrent review process consists of two levels of review: (1) focused baseline and M&V plan review and (2) comprehensive pre- and post-installation reviews. The steps in the typical concurrent review process are shown in Figure 2.

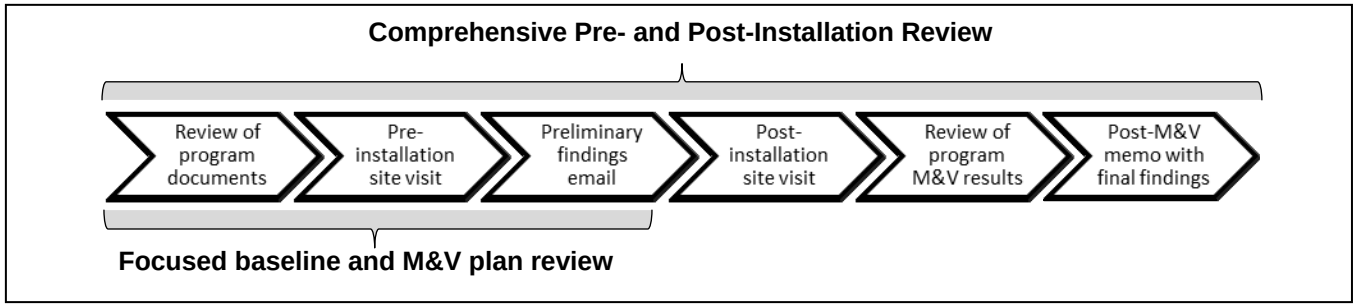

Figure 2. Typical Steps in the Concurrent Review Process

Although they are shown as a linear flow in figure 2, each step in the process includes a feedback loop that incorporates discussions and information sharing among the evaluators, technical reviewers, site staff, and program staff. These discussions and exchanges of knowledge and perspective are paramount to the success of the concurrent review. When implemented effectively they enable project, technology, and sector-specific educational opportunities related to M&V approaches, baseline characterization, and analysis methods.

- **Pre-installation review process –** During the pre-installation project review, the evaluators assess the baseline conditions using data collected during pre-installation site inspections in combination with program data, which include design reports, pre-installation metering, and program forms required by the IPE program. If needed, the evaluators will collect additional data from the participant, including existing equipment specifications, production volumes, and operating schedules. For projects undergoing a focused baseline and M&V plan review, the concurrent review process concludes with a memo following the evaluators' pre-installation site visit.
- **Post-installation review process –** For projects undergoing comprehensive pre- and post-installation review, the concurrent review process continues through project completion. The evaluators review the program's post-installation M&V reports and perform post-installation site inspections. Upon completion of each project review, the evaluators provide a report summarizing the actions taken and the recommendations made.

The status of projects and reviews is tracked throughout the review process via conference calls and emails among individual evaluation project review leads, program managers, and TRs. In addition, monthly meetings are held between evaluation and program leads to ensure that both parties are up to speed on project statuses and key deliverables. Every 2 months, a list of candidate concurrent projects is identified from NYSERDA's tracking database. This list is reviewed by the program and evaluation project managers and projects are assigned as either a focused baseline and M&V plan review, or a comprehensive review. Comprehensive reviews are generally reserved for particularly challenging projects where long-term production and M&V results are expected to be of the greatest uncertainty. Focused baseline and M&V plan reviews are performed on projects where little variance from the proposed operation is expected and baseline review and pre-installation metering are considered to be of the greatest benefit to project savings estimates.

When executed as planned, the concurrent review process will increase consistency between the program and evaluation in M&V baseline definition, methodology, and data collection without introducing bias into the evaluation. Further, the concurrent nature of the evaluation review has reduced the number of repetitive requests to the customer for site visits and data collection. Attribution analysis is not part of the process. A more detailed overview of the process and the initial observations about its success and challenges can be found in the 2013 IEPEC paper entitled "Pre-Retrofit Evaluation of Industrial Projects."[3]

Concurrent Review Findings

As of March 2015, thirty-six projects accounting for more than 127,000 MWh, 6.1 MW, and 319,000 MMBtu/yr in projected savings have been brought into the concurrent review process. These thirty-six projects are at various stages of review from pre-installation through final M&V. Three of the projects that have completed the concurrent review process were independently reviewed during a recent retrospective evaluation of the IPE program. This retrospective evaluation found the three projects to have realization rates (RRs) close to 1.00. The proximity of these RRs to 1.00 suggests that the concurrent review process has achieved its goal of minimizing the differences between reported and evaluated results. The retrospective evaluation RRs would have been both lower and more variable without concurrent evaluator involvement.

[3] "Pre-Retrofit Evaluation of Industrial Projects" presented at IEPEC 2013 and written by Jonathan Maxwell, Betsy Ricker, and Carley Murray, available at: http://www.iepec.org/conf-docs/conf-by-year/2013-Chicago/068.pdf#page=1

Evaluation recommendations and concerns most often noted during the concurrent review generally fell into three categories as highlighted in Figure 3. The issues associated with these categories, and the steps taken to address them, are discussed in the following section.

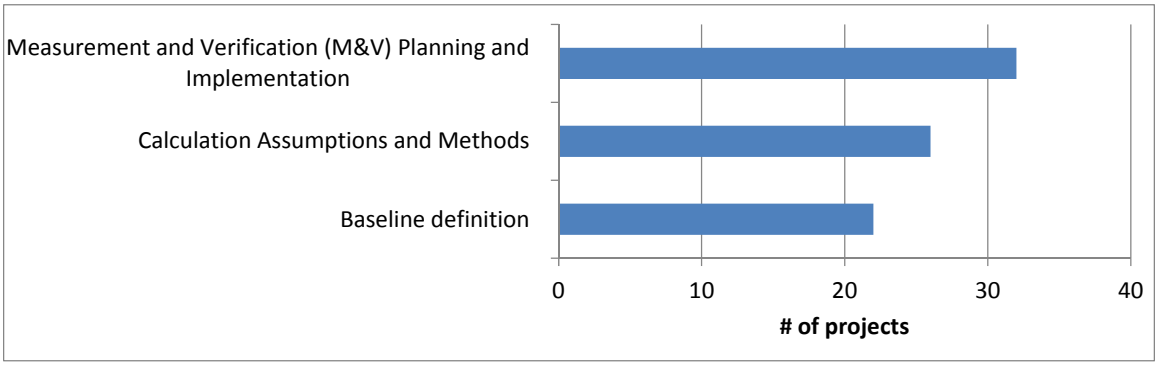

Figure 2. Most Frequently Occurring Concurrent Review Issues

1. **M&V planning and implementation** – The evaluators made recommendations to revise M&V plans on thirty-two of the thirty-six projects included in the concurrent review process. These recommendations included collecting additional data to triangulate whole-facility analysis results and providing better resolution on the M&V sampling, metering duration, and data collection strategies. On most projects the evaluators' recommendations were adopted by the program staff; however, there were instances where the program staff either did not collect all of the recommended data or where it was impractical for the measurements to be taken given on-site limitations. For such projects, the evaluators either solicited additional data from the site, or, where this was not feasible, included recommendations for such data collection in future retrospective evaluations. In general, the evaluators found that coordinating M&V activities with the program staff increased the likelihood that the requested data would be collected from the site, ensured that the proposed M&V was of a high level of rigor, and provided an opportunity for sharing M&V strategies with the program's contractors to improve future project data collection and results.
2. **Calculation assumptions and methods** – The evaluators recommended changes to calculation methods and assumptions on twenty-six of the thirty-six reviewed projects. Of the projects where such changes were recommended, most were large and complex capacity expansions that required regression analysis against an independent variable such as production rate. In recognition of this issue, and after discussion with both NYSERDA evaluation and program staff, a rigorous review of the program's M&V results was incorporated into the evaluators' review scope. This step of concurrent review had not been part of the review protocol but was added after a few early discoveries. The addition of this step to the review scope had benefits for both the evaluators and program staff. It provided the evaluators with the opportunity to verify that their recommendations were implemented and enabled the program staff to become more consistent in their approach and M&V of capacity expansion projects.
3. **Baseline definition –** Baseline characterization, particularly in an industrial environment, is a complex issue. There are few codes that are applicable to industrial manufacturing, and most manufacturing processes are unique, making it difficult to identify a standard practice. Projects with a component of capacity expansion provided additional challenges, as the existing baseline equipment must be supplemented with some theoretical baseline equipment in order to achieve the proposed post-installation production volumes. The issue had such a significant effect on so

many early projects that evaluators developed a baseline definition protocol that both the program and evaluators use.[4]

Baseline definition concerns were raised by the evaluators on twenty-two of the thirty-six reviewed projects. As with the calculation methods, baseline definition most often was an issue with new construction and capacity expansion projects. Further, conducting original baseline research was added to the evaluators' scope[5]. Over the last 3 years of the concurrent review process, the evaluators and program staff noted an overall improvement in the quality of the baseline documentation, analysis strategies, and data collection being performed by the program's technical reviewers both on projects that were and were not included in the concurrent review process. This was supported by observations made in the most recent retrospective evaluation of the IPE program.[6]

Overall, we estimate that the concurrent process influenced the administrator's reported electric energy, peak demand, or natural gas savings on eight of the ten projects that have completed the concurrent review process. Of these eight projects, two of them had evaluated savings that were within 5% of the program-estimated savings, three of them had evaluated savings that were within 10% of the program-estimated savings, and three of them had evaluated savings that were within 25% of the program-reported savings. On average, the ten projects where concurrent review has been completed resulted in evaluated savings that were within 2% of the program-reported savings.

There are still twenty-six projects actively undergoing concurrent review and the evaluators' influence on these projects is still to be determined. The remainder of this document provides insight into how the concurrent review process was effective in addressing the issues noted above and some of the challenges faced in implementing this process.

Keys to the Process's Success

There are several key aspects of the concurrent review process that have made it successful to date, the most important of which include:

- **Supportive regulatory environment** – The regulators must be comfortable with the notion that evaluators can collaborate with implementers over a long period and maintain the independence necessary to be unbiased. In New York the teams had this support from the Department of Public Service (DPS).
- **Collaborative review –** The concurrent evaluation review process is designed to streamline the evaluation review and encourage open communication and information sharing between evaluators and the program's technical reviewers. This differs from a more conventional retrospective evaluation in which evaluators review project documents and savings with limited discussion with program staff and their technical consultants until after the evaluation results are

[4] This citation is not available for the draft version of this paper. The final report is expected to be published before the paper is finalized, at which point the citation will be added. This appendix is currently added as a "draft" in the references section of this document.

[5] Early in the concurrent review process, the evaluators provided recommendations for baseline documentation and research, but did not perform research to validate the project baseline. In reviewing early concurrent review projects, it was found that additional research was warranted to both inform project-specific baselines and to better inform baseline definition for projects moving forward. On more recent concurrent review projects, the evaluators worked closely with the program staff to gather site-specific and third-party data to document project baselines. This coordinated effort produced more defensible and better documented project-specific baselines.

[6] This citation is not available for the draft version of this paper. The final report is expected to be published before the paper is finalized, at which point the citation will be added (currently added as a "draft" in the references section of this document).

calculated. The openness and respectful nature of the communication between the evaluators and technical reviewers during the concurrent review allows for effective information sharing and for both parties to gain a common understanding of the project and savings mechanisms. It also removes the feeling of the evaluators as an "auditor" and, over time, has led to the evaluators being integrated into the project review teams, which makes the technical reviewer and evaluators more open to learning from each other's technical expertise and willing to share information in real-time.

Example 1: *On one project, the evaluators worked closely with the program's technical reviewer early on to develop the project M&V strategy. During these discussions, the evaluators recommended that the technical reviewer collect detailed pre-installation and post-installation efficiency measurements for a boiler controls upgrade project, and the evaluators performed a detailed review of the resulting data. This review brought to light differences in the pre- and post-installation measurements that had a significant impact on the project savings. Had the technical reviewer not been open to the evaluators' early input and provided the raw data for evaluator analysis and review concurrent with their own assessment, this error may not have been caught and savings may have been incorrectly overstated by more than 200%.*

- **Allow implementers to make their own choices –** The program is not required to adopt the evaluator recommendations but is strongly encouraged to do so, to mitigate the risk of diverging realization rates on projects. The concurrent review team found that having the option of "agreeing to disagree" on baselines, analysis approaches, assumptions, and savings calculations, though rarely invoked, encouraged thoughtful communication and information exchange during particularly challenging reviews. It also allowed the team to close out projects rather than continuing to vet them endlessly while trying to converge on a solution. On the vast majority of projects, the evaluators and program staff worked together to converge on similar findings. However, on several of the concurrently evaluated projects, the evaluators and program staff were unable to reach consensus.

  Example 2: *On one particularly contentious project, the evaluators and program staff fundamentally disagreed on the project baseline, which resulted in a 60% decrease in savings between the program and evaluator estimates. Exhaustive discussions were held, information was presented, and adjustments were made to each party's position, but ultimately the evaluator and program savings would not converge. Despite the differences of opinion, the project discussions were respectful and professional, which enabled each party to articulate and share their perspective. It is possible that the concurrent evaluation review process could have been jeopardized if the program had been strong-armed into adopting the evaluators' recommendations.*

  Example 3: *On another project, the evaluators and program staff initially disagreed on the baseline for a manufacturing equipment upgrade project. The evaluators had performed previous research that indicated that the market for this type of machine was moving toward the program's proposed energy efficient equipment as baseline. Discussions were held among the evaluators, the program's technical reviewers, the site staff, and industry representatives to vet the technical and economic feasibility of various baseline options, and it was ultimately determined that although the market did appear to be shifting, at the time of the project's installation there was a cost-effective option available for installation that was consistent with the program's baseline definition. Therefore, the evaluators adjusted their baseline to be consistent with the program's, but both parties acknowledged that, in the*

future, this measure was deserving of careful scrutiny to account for the changing market for energy efficient equipment.

- **Streamlined communication and timely feedback -** the concurrent review process was most successful on projects with technical reviewers who were experienced with the process and its intent and evaluation review engineers who were able to provide timely and useful feedback. Initially, results were presented as formal memos, but the team discovered that something as simple as changing from a formal memo to an email of initial evaluation findings greatly improved the timing of that feedback. Making this process less formal also encouraged the evaluation engineers and technical reviewers to pick up the phone and discuss projects rather than wade through more formal communication channels that could delay the project. Formal report deliverables after the final pre- and post-project installation feedback are still provided by the evaluators to the team.
- **Projects must be brought in early –** the process is most effective when enacted prior to project installation, as early project review and evaluator involvement help to mitigate lost opportunities. When early review is not completed, there is a risk that the evaluators will come in after key milestones have passed and propose changes that dramatically alter the program's savings calculations.

  Example 4: *In one instance, the evaluators were brought onto a project to review the baseline after the project installation had commenced. Although the evaluators and program staff agreed on the fundamental baseline definition, it was clear that pre-installation metering was needed to accurately quantify the baseline energy use. Because the evaluation team came onto the project late, such metering was not possible. This created uncertainty in the savings and led the evaluators and program staff to alter the concurrent review process to bring projects into the process even earlier in their implementation cycles, even if their implementation timelines were not fully vetted. This has led to more informed baseline definitions and pre-installation metering, but it has also resulted in at least one project that received early evaluation review but did not come to fruition.*

  Example 5: *In another instance, the evaluators were brought in before project installation but after incentive commitment to the customer. If the evaluators had recommended a different baseline or calculation method and the program staff agreed, the staff would have had limited options to re-align the reported savings and the incentive with expected savings.*
- **Commitment to extra tracking and management costs –** Managers from NYSERDA and the evaluation team worked closely to facilitate the concurrent evaluation review process. This management required a great deal of organization, attention to detail, close tracking of project statuses and milestones, and technical expertise in order to guide project reviews to completion. It also required all managers to be strong in their perspectives while also being open to and able to negotiate differences in opinion. The team implemented monthly check-ins in which each project's status and outstanding action items were summarized and next steps were planned. These monthly check-ins increased the likelihood that the evaluators would not miss opportunities to review project's before the completion of key milestones (i.e., before installation and M&V). When possible, technical issues were also vetted during these calls. This level of organization and manager involvement was paramount to the concurrent review process's success and could be even further improved my implementing real-time tracking systems in which both the program and evaluation managers have access to up-to-date project status information and use a common tracking system to manage the project. ERS has done this successfully on recent evaluation efforts in which we have implemented real-time tracking to

provide project feedback and status updates to program staff, and a similar system would benefit a concurrent review process like the one described here.

- **Feedback informs the entire program –** the concurrent review process Program Manager disseminated lessons learned from concurrent review projects to other members of the program staff on a bi-weekly basis. This information was then disseminated to technical reviewers via case studies and lessons learned during periodic meetings and more regularly on individual projects. In addition, the program adopted lessons learned through the concurrent review process to generate guidelines for technical reviewers on issues such as baseline definition. These activities allowed the program to leverage the individual project reviews to share lessons learned with their implementation teams, increasing the overall value of the process.

Cost Considerations

As discussed in the 2013 IEPEC paper, the concurrent review process has required administrative resources from the program and evaluation teams (including managers, technical reviewers, and evaluation engineers) beyond that which would have been required in a conventional retrospective impact evaluation. Time is required to identify projects, collect and deliver information, participate in monthly pre-installation tracking and management meetings, and execute project-specific reviews. The program and evaluation managers each estimate that, on average, this process adds 10 to 15 hours per project of additional time to each team's management spending. In addition, the typical concurrent review process has required about 60 hours of evaluation engineer time per project to complete the review. For reference, in the evaluators' experience, a typical retrospective review of similar rigor would require up to 100 hours to complete.

The authors believe that the benefits of the process make these marginal added costs worthwhile. Specifically, we predict that the error ratio on concurrently reviewed projects is likely to be in the range of 0.10 to 0.20 and that the educational influence from the process on all IPE custom projects is likely to reduce the error ratio on nonconcurrent review projects from 0.34 to 0.30. Given the historic mix of concurrent and nonconcurrent projects and presuming the same stratification variables in the next evaluation as the last, the net effect would be a reduction in the number of projects required to be evaluated from sixty-six to fifty-five. At an average per-project evaluation effort savings of 30 hours per project, the concurrent evaluation early investment has the potential to result later in net evaluation savings of about 330 hours, or roughly $40,000[7].

Nonetheless, the added cost means that this process needs to be applied selectively. The above procedure is applied only to the largest and most complex projects. There likely are smaller projects that would benefit from the reviews, but economics prevent review of each.

Challenges, Cautions, and Pitfalls

The concurrent review team has found the process to be successful but also recognizes that there are challenges to its implementation. Some of them have included:

- **Less-formal feedback = Smoother reviews -** The evaluation team initially required formal feedback reports for each project milestone in the concurrent review. While such documentation was of benefit to formally capture the evaluation feedback, it took time to compile and often led

[7] This net total is the incremental difference between evaluating the projects concurrently vs. retrospectively. We estimate that evaluating them concurrently takes approximately 70 hours per site, while evaluating them retroactively would require 100 hours per site. The 30-hour difference is the net cost savings associated with implementing the evaluation concurrently.

to delays in issuing review feedback, greatly slowing the concurrent review process. To remedy this, the review team moved to an email-based feedback template and encouraged direct and speedy communication between evaluators and technical reviewers. This improved the timeliness of the evaluation feedback and the overall communication between the evaluators and technical reviewers.

- **Overcoming concerns about including "bad" projects –** Early in the process, program staff members were reluctant to bring projects into the concurrent review process until they were confident that they were good candidates for review. This led to a risk that some projects were not brought into the process early enough to facilitate pre-installation review by the evaluators and led to missed opportunities for pre-installation metering and early baseline. As the process matured, the program staff became more willing to risk including imperfect candidate projects to ensure that the benefits of the concurrent review could be maximized. This has enabled earlier project reviews and has mitigated the risk that evaluators are brought onto projects after key milestones such as project installation have already been completed. To date, the benefit of being involved early has outweighed the extra review time invested in those few projects that did not come to fruition or were too logistically challenging to review.
- **Growing pains are inevitable –** Many of the lessons learned over the course of the concurrent review process were garnered through experience. This meant that there were growing pains along the way as the program and evaluation managers, technical reviewers, and review engineers became familiar with the concurrent review process and its objectives. These included the challenges in communication and timeliness noted above as well as adjustments to management strategies to better enable the process to be effective. For example, over time it became clear that the responsibility for ensuring that review feedback was provided needed to be tracked by the management team, but the onus for providing project updates had to be on the technical reviewers and evaluation review engineers. It simply was not possible for the management team to be familiar with the ins and outs of every single effort. By relinquishing some of this responsibility while maintaining involvement at key milestones, the overall management of the effort was made more effective.
- **Maybe we need that rearview mirror (challenges to long project timelines) –** The concurrent nature of the evaluators' project review means that issues such as measure interactivity and typical production can be difficult to capture, especially for projects where measures are implemented and paid in installments over many years. In such cases the concurrent review process has focused on assessing the reasonableness of savings claims given known future interactivities and anticipated production rates, but this particular issue can be a drawback to the concurrent review process. A conventional retrospective evaluation typically looks at projects after they are 100% complete, allowing for a comprehensive review and assessment of the measure interactivity; this is not possible with concurrent reviews.
- **Independent collaboration** – the concurrent review process requires a high degree of collaboration between technical reviewers and evaluators. This has the potential to raise concerns regarding the independence of the evaluator perspective. One of the success factors in maintaining independence is having equally strong, knowledgeable, and committed team members in all roles. The process must include the ability to articulate differences of an opinion in an open, constructive manner. Although the communication and work have been collaborative, the evaluators have been very careful to maintain an independent perspective of the project, which allows them to arrive at unbiased savings estimates. Having the previously mentioned "agree to disagree" option allows all parties to remain independent and bring the projects to conclusion.

Although some of these challenges, such as issues faced with long project timelines, cannot be avoided in the scope of a concurrent review, others can be vetted through early discussion and stakeholder involvement. This includes working with program staff, evaluators, technical reviewers, regulators, and other parties that are invested in the evaluation to outline the goals and challenges of the concurrent review process and to define realistic objectives and strategies for the review. Such discussion should encourage open dialogue and enable input from a variety of perspectives, thus setting the groundwork for a productive working relationship and productive discussions throughout the concurrent review process.

For example, through the concurrent review process, the program and evaluation teams recognized that formal feedback, although important to documenting the process, was acting as an impediment to early and timely feedback. By reducing the formality of this feedback the team was able to streamline the process and focus in on the most material impacts of the review. Early discussion of the process goals with all of the key parties, and open dialogue about the likely challenges to their achievement may have enabled the team to foresee this and other challenges ahead of time, which could have saved time and improved process efficiency earlier in the concurrent review.

Summary

Concurrent review by the evaluators can be a powerful tool to mitigate uncertainty associated with impact evaluation, leading in this example to consistently favorable realization rates. This is attributed to the collaborative but independent work of the evaluation and program teams leveraging timely feedback on key project evaluation variables; baseline characterization, and measurement and verification methodology. The concurrent approach has yielded additional benefits beyond realization rates. The collaborative approach has strengthened the working relationship of the evaluation and program staff, and it provides a real-world classroom where evaluators and program staff share experiences, perspectives, and methodologies in an attempt to generate the best savings estimates possible.

The features of the process and program that the concurrent review team found to be most important to the success of this review included:

- A high degree of organization and collaboration between evaluators and technical reviewers
- Having organized, invested, and technically adept Project Managers on both the program and evaluation side who were able to articulate and navigate differences of opinion.
- Open-minded technical reviewers and evaluators who were able to get beyond the “auditor” view of evaluators and to work hand in hand to gather data and execute plans.
- A focus on education and converging understanding as well as calculating the most accurate savings for each project.

Although this process does not eliminate disagreement and it requires additional resources, it can be a cost-effective approach, especially for programs that already have M&V requirements. It can also improve performance measurement quality both for program administrators and for the evaluators. Further, this concurrent review appears to be a good educational tool for early feedback. However, any program considering the implementation of a concurrent review process needs to be prepared to make an upfront investment in the process and needs to have the flexibility to adjust as the process moves along.

The concurrent review process described in this paper is likely too costly and involved for prescriptive programs and those with less-complex measures and analysis strategies, or where the majority of program savings comes from many small projects rather than a small number of large projects. The concepts and principles of the concurrent review process likely hold merit for programs outside of the industrial sector. The mechanisms through which the concurrent review principles are implemented will need to vary to match the resources and goals inherent in any particular program.

References

Megdal & Associates Team, Jonathan B. Maxwell, Principal Investigator, and Betsy Ricker, ERS; Lori Lewis, Megdal & Associates; Kathryn Parlin, West Hill Energy & Computing, 2012. *NYSERDA 2009–2010 Industrial and Process Efficiency Program Impact Evaluation Report*, September 24, 2012.

ERS Team, Jonathan B. Maxwell, Principal Investigator, and Betsy Ricker and Nick Collins, ERS; Kathryn Parlin, West Hill Energy & Computing, 2012. *NYSERDA 2010–2012 Industrial and Process Efficiency Program Impact Evaluation Report, draft submitted December 2014.*

ERS Team, Jonathan B. Maxwell, Principal Investigator, and Betsy Ricker & Nick Collins, ERS; Kathryn Parlin, West Hill Energy & Computing, 2012. *Appendix TBD to NYSERDA 2010–2012 Industrial and Process Efficiency Program Impact Evaluation Report, draft submitted December 2014*.

Maxwell, Jonathan B., Betsy Ricker, and Carley Murray, 2013. *Pre-retrofit Evaluation of Industrial Projects*, presented at IEPEC 2013 in Chicago, August, 2013.