

Begin with the End in Mind: Optimizing Evaluation Opportunities

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ABSTRACT

It's important to begin program evaluations with the end in mind and optimize evaluation opportunities. Historically, evaluations of energy efficiency programs have been performed *ex post* – after the program has ended. In 2008, a Midwest utility became one of the first to test an *ex ante* approach by simultaneously hiring evaluation and implementation contractors for a new portfolio of programs. This paper describes innovative lessons learned from an early adopter of this paradigm.

Benefits of hiring both contractors simultaneously include evaluators being able to attend program design roundtable discussions, review *ex ante* deemed savings values, and identify critical data needs to ensure appropriate data is collected and tracked. Evaluators leveraged saturation surveys from a concurrent DSM Potential Study to determine appropriate program baselines rather than conducting their own surveys.

Evaluators interviewed customers and implementers throughout the program cycle and installed monitoring equipment both pre- and post-installation. They leveraged contractor data to minimize the need to ask customers for that information. Frequent feedback on the program allowed continuous improvement including a redesign of the residential portfolio, more timely cost recovery of energy efficiency expenditures and valuable input to integrated resource planning.

Based on early experiences, AmerenUE and its implementation contractors have learned the following important lessons from this new approach:

- Tracking systems need to be well developed, understood and usable by everybody
- Real-time evaluation needs real-time data for both completed and potential projects
- Avoid blurring the lines between implementation and evaluation
- Additional reviewers can create delays

With these lessons in mind, hiring evaluators early in the process can optimize evaluation opportunities and lead to successful energy efficiency programs.

Introduction

Evaluation is the process of determining and documenting the results, benefits, and lessons learned from an energy efficiency program. Evaluation results can be used in planning future programs and determining the value and potential of a portfolio of energy efficiency programs in an integrated resource planning process. It can also be used in retrospectively determining the performance of contractors and administrators responsible for implementing efficiency programs. Historically, evaluations of energy efficiency programs have been performed *ex post*. In 2008, AmerenUE, a Midwest utility became one of the first to

simultaneously hire evaluation and implementation contractors for two new portfolios of programs. AmerenUE took this step because it believes it is important to begin with the end in mind and optimize evaluation opportunities. This paper will describe innovative lessons learned from an early adopter of this paradigm of hiring evaluators early in the process.

Background

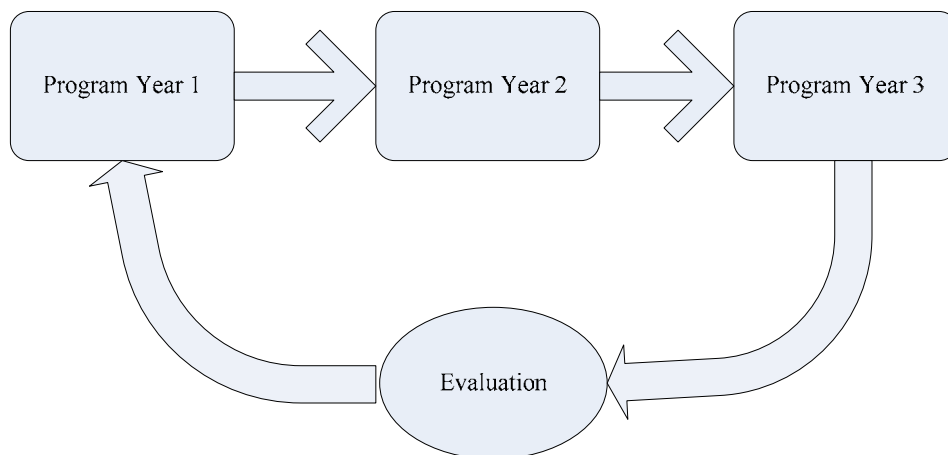
In the spring of 2008, AmerenUE issued a Request for Proposal (RFP) for implementers of a Business Portfolio and a Residential Portfolio of energy efficiency/demand response programs based on preliminary designs from its Integrated Resource Plan. The initial Business Portfolio called for four energy efficiency programs (Custom, Standard, Retro-commissioning, and New Construction) and three demand response programs (Commercial Demand Credit, Commercial Demand Response – Critical Peak Pricing, and an Industrial Interruptible Tariff). The initial Residential Portfolio called for seven energy efficiency programs (Energy Star Homes, Home Energy Performance, HVAC Tune-up, Lighting & Appliance, Low Income, Multifamily, and New HVAC) and two demand response programs (Demand Response – Critical Peak Pricing and Demand Response – Direct Load Control). AmerenUE intended for both portfolios to run for approximately three years, from late 2008 through September 2011, although not all programs were intended to be launched in the first program year.

The Integrated Resource Plan also laid the groundwork for understanding and managing program and portfolio risks. One of those risks was that independent Evaluation, Measurement & Verification (EM&V) contractors might use different assumptions than implementers used to estimate energy savings estimates and conclude that the programs did not meet their energy savings targets. To address this risk, AmerenUE decided to launch program design and evaluation activities at the same time. There is always uncertainty about whether planning estimates will match evaluation results, regardless of when an evaluator is hired. However, AmerenUE felt that having an evaluator involved in reviewing these initial assumptions would minimize the risk by ensuring that the initial values were within an acceptable range based on evaluations of other programs.

Hiring implementation and EM&V contractors simultaneously also allows all parties to understand evaluation protocols at the outset. It allows the evaluation process to be continuous as opposed to *ex post*, allowing program implementers to adjust design and delivery to real-time information from the evaluators. This approach views evaluation not only as an independent verification of performance for regulatory purposes, but also as a vital input to continuous program improvement.

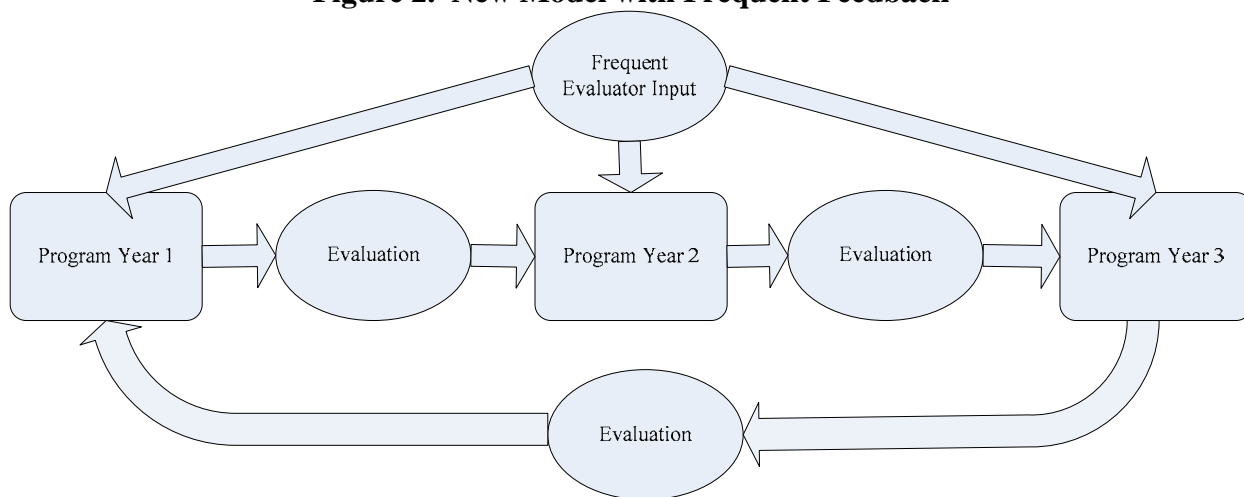
In the original *ex-post* model for evaluation, program sponsors and implementers receive feedback and suggested program improvements from evaluators only at the end of the implementation period, as shown in Figure 1.

Figure 1. Traditional Ex-post Evaluation Model



In the more recent best-practice model, evaluators provide frequent feedback during each program cycle, an annual evaluation and at the end of each implementation year, and a final evaluation report at the end of the three-year program cycle, as shown in Figure 2.

Figure 2. New Model with Frequent Feedback



To provide this continuous feedback loop, AmerenUE issued an RFP for evaluators for its Residential and Business Portfolios approximately two months after it released and RFP for program implementers. By the time interviews and contract negotiations were completed, all implementers and evaluators began work within a few weeks of each other. There are separate evaluators for the residential and business portfolios. The evaluators were to submit process and impact evaluations six months after the completion of each program year, and a final report nine months after the completion of the third and final program year. In addition, the evaluators were to submit monthly progress reports and participate in weekly conference calls.

After the first year after AmerenUE implemented this approach, it became clear that involving evaluators soon after program launch had unique advantages and disadvantages for the utility, implementer and evaluator, and these perspectives are not always aligned.

Advantages

Several benefits of hiring evaluators and implementers simultaneously were discovered. These include:

- Feedback on program design and stipulated values
- Opportunities for evaluation training
- Inputs on customer forms and data tracking
- Ability to install pre-installation monitoring
- Ability to make program improvements during implementation cycle
- Capturing data that would be lost when an implementation team changes
- Support to obtain regulatory approvals
- Ability to provide unexpected evaluations such as for short-term pilots
- Ability to leverage other opportunities

Program Design

Early involvement by evaluators in both the Residential and Business Portfolios allowed evaluation issues to be identified early and dealt with proactively.

One of the benefits of hiring both contractors simultaneously is that evaluators were able to attend program design roundtable discussions. Because these were completely new portfolios and programs, AmerenUE's immediate challenge was to quickly build the infrastructure required to meet the three-year objectives. During these roundtable discussions, the evaluators offered feedback on the proposed measures and incentives. For example, the Business Portfolio evaluators offered input on which measures to include in the Standard Program, minimum payback periods for projects in the Custom Program, and how the proposed incentive levels compared to best practices from other programs. During one of these discussions, the Business Portfolio evaluator pointed out the potential for "double-counting" CFL-related savings. Because screw-in CFLs receive a buy-down incentive at many retailers from the Residential Lighting & Appliance Program, small commercial and industrial customers potentially could buy them at a discount, install them and get an additional incentive from the Business Standard Program. The evaluator suggested a solution to this: incenting only pin-based CFLs in the Business Standard Program.

Residential evaluators reviewed measures and delivery methods, such as customer rebates, upstream rebates, direct installation, and drop shipping. This was helpful because AmerenUE had not consistently invested in energy efficiency programs and customer awareness of energy management options is generally lower than customers of utilities with sustained funding and active consumer energy efficiency awareness campaigns. By getting input on measures from evaluators, AmerenUE and the implementers felt confident that they had chosen the right mix of measures and reasonable incentive levels.

Stipulated Values

The evaluators also reviewed *ex ante* deemed savings values. With feedback from evaluators, AmerenUE and the implementer were able to agree in advance on stipulated values for items such as useful life, hours of operation, and kWh savings for all standard measures.

This allowed AmerenUE to more accurately track progress towards achieving the kWh and kW savings goals set in the Integrated Resource Plan. It also provided more confidence that the programs would pass cost/benefit tests, which are critical to program approval. AmerenUE can only implement programs in approved tariffs that pass the Total Resource Cost (TRC) Test. The implementers also benefited from having the stipulated values set forth in Technical Reference Manuals (TRMs), which they referred to extensively during implementation. This accelerated application processing and improved customer satisfaction. Program participants were happy with the quick turnaround in program year 1. The TRMs also gave evaluators a single document detailing all program assumptions. While the evaluators reviewed the stipulated values in the TRMs to ensure they were within an acceptable range, they independently calculated energy savings during the impact evaluation using a variety of methods including engineering models and lighting loggers.

Evaluation Training

Evaluators provided Evaluation, Measurement and Verification training to AmerenUE staff, the implementers, and regulatory stakeholders early in the process. The training covered common terminology, evaluation goals, planning, data collection and analysis. At the request of the business implementer, the business evaluator provided additional detailed training about how gross and net savings are analyzed and how cost effectiveness is calculated. This helped the implementer understand how the program would be evaluated and why it was important to implement the program as designed. This helped all parties know what “begin with the end in mind”. Most importantly, the training helped the implementers understand that an effective evaluation could protect the programs’ integrity and benefit everyone. There helped dispel and concerns about an inherent adversarial relationship between evaluators and implementers.

Customer Forms and Data Tracking

Evaluators were also able to provide input on customer forms and the data tracking systems, which helped ensure the collection and tracking of appropriate customer data. This is a significant advantage to early evaluation because data that are not tracked at the beginning of program implementation will most likely never be recovered. As a result of this process, the business program evaluator revised some customer forms. In addition, the business evaluator was able to review data in the tracking system periodically and there was good coordination between the evaluator and implementer on large projects that required monitoring. The implementation contractor for the Residential Programs did not complete the tracking system. The first year evaluation listed completing the tracking system as a priority (Colby).

Pre-Installation Monitoring

Real-time access to the tracking database allowed the business evaluator to install monitoring equipment both pre- and post-installation for many projects. AmerenUE believes that the business evaluator possesses both the expertise and equipment for monitoring that the business implementer does not have. Therefore, the early involvement of the evaluator allowed the gather of pre-installation monitoring data. The monitoring equipment allowed the business evaluator to measure parameters such as motor load factor and energy use and more accurately

estimate what energy use would have been if the high-efficiency motor had not been installed. Evaluators also leveraged data from trade allies implementing the program to limit customer “touches” and improve customer satisfaction. Without the early involvement of the evaluators, trade allies would most likely not have collected all of the needed data. This reduced the need for the business evaluator to collect data after-the-fact – a process that can be both expensive and produce less accurate information. In addition, business implementers and evaluators decided to have the implementers send an email notification to evaluators about major projects that could require pre-monitoring. This provided quicker notification than periodic checks of the database and ensured that pre-monitoring did not impact project start dates. Early notification also allowed the business evaluator to explain to customers which data need to be collected on existing systems before their removal.

The business evaluator also was able to supplement energy saving information provided by the implementer, particularly for HVAC measures. For projects whose energy savings calculations were based on DOE-2 or another model used by a trade ally, the evaluator analyzed and verified the input values and assumptions made for the model. When no modeling information was available, the evaluator contacted the engineering firms performing the upgrade to obtain site information and used building simulation software to model energy use. Site visits were used to verify inputs. For projects where additional control components were added, the evaluator checked and verified programming inputs to ensure that they were consistent with the original calculations. For VFD measures, the evaluator could verify the installation of a VFD would save energy by monitoring how energy consuming equipment fluctuated under changing conditions.

Program Improvements During the Implementation Cycle

Evaluators provided input to many program changes during the implementation cycle. One of these changes was a reduction in the simple payback period criteria for custom projects from 2 years to 18 months. The business evaluator had the experience to know that other programs throughout the country use an 18-month payback criterion, and that the reduction alone would not cause significant concerns about free-ridership. During the first-year impact evaluation the evaluator asked a series of questions to determine free-ridership. The resulting Net-to-Gross Ratio (NTGR) for the Custom Program was 74%, however this is expected to increase in subsequent years as there was a number of customers that knew the AmerenUE program was going to become available and waited for the AmerenUE program to be offered before installing planned projects (ADM). The shortened payback period did not appear to be a factor in the NTGR.

One important improvement involved electric/gas parsing to allocate savings for a measure that reduce both electric and gas consumption. The evaluator pointed out other utilities attribute a percentage of the measure cost to electric savings and the remaining percentage to gas savings. Because the AmerenUE programs are for electric savings only, AmerenUE is not allowed to include gas savings in the TRC calculations. Electric/gas parsing has allowed AmerenUE to partner with the local gas utility on some projects that would not have passed cost-benefit tests based on electric savings alone.

Another significant change was moving common area measures from the Multi-Family Program to the Business Custom and Standard Programs. This was a logical move as the measures and incentives involved were nearly identical to those in the Business Programs and

the customer accounts involved typically were on nonresidential rates. Evaluators fully supported this move as being similar to programs they had seen in other states.

Capturing Major Implementation Changes

Evaluators conducted a process evaluation after the first year. This was critical for the Residential Portfolio as AmerenUE chose to change the implementation team after the first year. Had process evaluation interviews not occurred at this time, all knowledge on implementation for the first program year would have been lost. Recommendations for improvements to the Lighting & Appliance Program included (Colby):

- Move to a monthly payment and invoicing system
- Remove the requirement that participating retailers stock at least four products
- Tie cooperative promotional incentives to the amount of products sold
- Simplify the program for small, independent retailers
- Make consumer education a priority
- Conduct store visits to investigate reports of program CFLs being priced similar to non-program CFLs
- Consider increasing incentives for appliances and investigate whether additional appliances could qualify for incentives

Recommendations for improvements to the Multifamily Program included (Khawaja):

- Establish achievable goals based on similar, less mature markets, then increase goals over time as the program and markets mature
- Increase incentives offered early in the implementation period to allow the program to ramp up and customers to build trust more quickly
- Consider frontloading incentives to the greatest extent possible or offer financing, as this would increase the program's appeal, especially to small community organizations lacking cash flows and financial expertise
- Reduce the number of standard efficiency measures offered, reducing complexity and confusion among program participants
- Lessen the importance of geographic diversity during early phases of program implementation, and allow implementers and contractors to ramp up the programs in denser, more cost-effective urban areas

The new implementers were able to use results of these process evaluations to improve the Programs in years two and three.

While the business team did not experience these changes, they were also able to use the process evaluation to guide continuous improvements throughout the program cycle. Recommendations for improvement included (ADM):

- Changing program focus from geographic areas to submarkets such as including supermarkets, schools, universities, large offices, and hospitals
- Simplify application forms and encourage the use of digital forms

- Devote further effort to devise methods to capture more contact data such as the use of business card scanners and/or developing more automated capability to capture caller identification information
- Improve the relationship with AmerenUE's customer contact employees to increase their promotion of the programs

Regulatory Support

Evaluators also played a key role in answering concerns expressed by AmerenUE's regulatory stakeholders, such as our Public Service Commission (PSC). Evaluators participated in conference calls with PSC staff prior to tariff filings in order to garner their support for AmerenUE programs. Evaluators also participated in quarterly meetings with regulatory stakeholders to present evaluation plans early in the implementation process and to provide periodic updates on the progress of the evaluations.

One of the main concerns that evaluators were able to address is leakage in the Lighting & Appliance Program. Because the CFL portion of the program relies on midstream and upstream incentives, there is no way to guarantee that sales will remain within the area served by AmerenUE. The AmerenUE service territory is adjacent to a sister utility in Illinois, the Ameren Illinois Utilities, (AIU) as well as many cooperative and municipal utilities. The residential evaluator was able to reassure regulatory stakeholders that the evaluation would closely monitor leakage by using customer intercepts at stores near the borders of the AmerenUE service territory. These intercepts will survey customers purchasing program CFLs to determine if the bulbs are leaving the AmerenUE service territory. The evaluators also increased the number of planned customer intercepts at the stakeholders' request.

Regulatory stakeholders expressed other concerns about the market transformation aspects of the Lighting & Appliance Program. Regulatory stakeholders erroneously believed this was a new concept being practiced only in statewide programs. The evaluators provided documentation that midstream and upstream incentives offered by other programs, including some in the Midwest, are effective and the program results are measurable. The residential evaluator made detailed presentations to stakeholders explaining the upstream evaluation model.

Support from evaluators became critical after the end of the first program year when AmerenUE was in the middle of a rate case. AmerenUE tracks all energy-efficiency expenditures in a regulatory asset account. It then seeks recovery of those expenditures in a general rate case. If allowed, the expenditures are amortized over a ten year period. PSC staff filed testimony questioning the expenditures of the Residential Programs and argued against cost recovery. PSC staff claimed that costs of energy-efficiency programs should be recovered only after the programs were evaluated. The annual evaluations may become essential to allow AmerenUE to recover the cost of these programs in a timely manner instead of waiting until after the three-year program ends.

Evaluation of Short-Term Pilots

During program year 1, the residential team decided to implement a pilot program called Personal Energy Manager (PEM). PEM used a price signal to incentivize participants to reduce their usage during price response events. Participants received a variety of devices to control or monitor their usage including in-home displays and programmable thermostats. A control group

received no such devices. Participants, including the control group, received a credit on their bill if they reduced their usage during an event below their consumption on the two previous non-event weekdays, but did not receive any penalties if they did not reduce their usage. Because the residential evaluation team was in place, they could evaluate this pilot that had not been included in their original contract, and could help the residential team prepare the business case for rolling out the program company-wide.

Leveraging Cooperation

AmerenUE had the benefit of launching its programs at the same time that adjacent sister utility AIU hired evaluation contractors and implementation contractors. This allowed both utilities to share evaluation results and compare contractors in real-time.

Evaluators leveraged surveys used in a concurrent DSM Potential Study when determining appropriate program baselines. For instance, the residential evaluator was able to include questions on the surveys regarding where customers had purchased CFLs and asked customers to volunteer to have lighting loggers installed in their homes. Without this, the evaluator would have had to cold-call AmerenUE customers to obtain a sufficient sample.

Disadvantages

Hiring evaluators early in the implementation process also had some disadvantages, including:

- Program re-designs impact on evaluation plans
- Idle time for evaluators due to slow program ramp-up
- Program year 1 had a limited number of projects to be evaluated
- Danger of over-reliance on the evaluator

Costly Program Re-designs

Most of the evaluation funds spent early in the implementation process were allocated to evaluators' review of multiple program designs and re-designs rather than actual program evaluation. As noted in the section on Program Design on page 4, evaluators' participation in the review process was invaluable, but it would have been more effective to involve them in the reviews of materials that were closer to final products. As a result of the program re-designs, evaluators had to revise their evaluation plans several times, increasing evaluation costs. Another disadvantage to evaluators reviewing program designs is that additional reviewers for each design change can create implementation delays

Slow Program Ramp-up

Once programs are implemented, there is a lull until programs actually ramp up and start producing results that can be evaluated. During this time the utility should delay evaluation. AmerenUE held weekly phone calls with the evaluators to discuss the programs' status. However, since these were not particularly substantive discussions, they probably should have waited until early program milestones were achieved.

Limited Number of Projects for Program Year 1 Evaluation

The design phase of AmerenUE's programs took longer than expected, delaying implementation. As a result, only three of the Business Programs required process and impact evaluations. Even then, the number of projects to be evaluated was relatively low, and the evaluator proposed extending program year 1 to provide more projects for evaluation. AmerenUE chose not to extend program year 1 for the Business Programs in order to keep the program years consistent with the tariff and Integrated Resource Plan. However, due to the small number of projects in program year 1, AmerenUE staff learned that a group of projects by a single customer could have a significant impact on the Net-to-Gross Ratio if that customer was a free rider. In hindsight, it may have been better to extend the program year to increase the number of projects for evaluation.

At the end of program year 1, only three Residential Programs had been rolled out and only one of these had any kWh savings, and they were significantly lower than expected. Although five Residential Programs were expected to be evaluated after program year 1, only three merited process evaluation and only one merited impact evaluation.

As a result of these delays, the actual expenditures differed significantly from the original budget. The total expenditures were approximately 50% of the evaluation budget for program year 1. The amounts spent on creating evaluation plans and reviewing the tracking database were a higher percentage than anticipated. Most of the other expenditures were close to the expected percent of the total spent.

Comparison of Actual Expenditures vs. Budget

Task	Year 1 Actual	Year 1 Budget
Evaluation Plan	12%	8%
Verification and QA/QC Plan	0%	6%
Review Tracking Database	8%	3%
Program Evaluation	60%	57%
Report/Manage	17%	20%
Evaluation Support	2%	5%

Danger of Over-Reliance on the Evaluator

Finally, while it is mostly advantageous to have good communication between the implementer, utility, and evaluator, one must be aware that one of these parties might interfere with another's process. While it is beneficial for all parties to provide their input and perspective, the evaluator cannot dictate whether an implementer should approve a project, and the implementer cannot dictate whether an evaluator considers a customer a free rider. In one example experienced by AmerenUE, the business implementer asked for a "ruling" by the evaluator on a particular group of projects. Instead of advising whether the incentives should be awarded, the evaluator suggested that implementer talk further with the customers to try to assess their "state of mind" as to whether the projects would have proceeded without the incentive. As a result, the implementer included this line of questioning in its customer interviews.

Things to Consider When Hiring Evaluators Early in the Process

Early in the implementation process, utilities should decide if the evaluators will have access to the actual tracking database, or will receive periodic extracts from it. Both options have advantages and disadvantages. If the evaluators have immediate access to the database, they can determine quickly if data are missing or confusing. They also may be able to generate reports at their convenience, rather than waiting for a periodic report from the implementer or utility. This can be helpful when the evaluator is looking for large projects for pre-installation inspections and pre-monitoring. If they are relying on a quarterly report, they may not learn of a large project until the opportunity for pre-installation monitoring has passed. A disadvantage of allowing evaluators access to the database is that they may require additional training to use it and the utility may need to pay for additional licenses. If the latter is an issue, one solution is sharing user IDs. If the evaluator has access to the full database, they should have access to all of its query functions and the implementer must update project information in the database quickly. There is no value in having the evaluator generate weekly reports to review large projects for pre-installation monitoring if the project information is not being entered or updated in a timely fashion. If evaluators do not have access to the database and are relying on periodic extracts, the implementer or utility should send them to the evaluator per a pre-approved schedule. It may be possible to have these reports generated automatically by the database. It may be most appropriate for the evaluator to have full database access for programs, such as Business Custom where timing is key, while it may be more appropriate for evaluators to receive periodic extracts for other programs, such as Residential Lighting & Appliance.

Real-time evaluation needs real-time data for completed and potential projects. Database extracts, or even periodically analyses, may not be sufficient. For very large projects that the customer is anxious to install, it may be best to notify evaluators by email to give them more timely notice than periodic data checks would provide.

It is important to avoid blurring the lines between implementation and evaluation. It is easy to rely too much on evaluators. They should not be expected to design programs or approve every project prior to installation. These are the responsibilities of the implementers. Having evaluators review every change also can create delays.

Conclusion

AmerenUE has learned that hiring evaluators early in the energy-efficiency program review process has had advantages and disadvantages. Advantages have included receiving evaluator's valuable feedback on program design and stipulated values. Early involvement also has increased opportunities for pre-monitoring and the capture of required data and has facilitated continuous program improvement.

However, if evaluators are hired too early they may have too little to evaluate during program ramp-up. And while evaluators can provide early feedback early in the design process, the utility must determine whether this is appropriate and cost effective. In addition, the utility and the implementer can become too reliant on the evaluator and seek their input on too many decisions.

Despite these disadvantages, AmerenUE believes that hiring evaluators early in the program implementation process is beneficial. However, these disadvantages show that the utility, the implementer and the evaluator must be flexible and adapt the evaluation to each program's roll-out and ramp-up.

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