B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Framework to Guide Custom Project Evaluation

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Prepared by
Research Into Action / Schiller Consulting

Final Report

Framework to Guide Custom Project Evaluation

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1 INTRODUCTION

Bonneville Power Administration (BPA) asked the team of Research Into Action, Inc. and Schiller Consulting, Inc. to assist it in developing a framework to guide the evaluation of custom projects beyond its current measurement and verification (M&V) activities. BPA engaged in this framework development in response to a recommendation in *Research Supporting an Update of BPA's Measurement and Verification Protocols.*[1]

A team comprised of staffs from BPA (evaluation and market research, and energy efficiency), Research Into Action, and Schiller Consulting engaged in four meetings in the second half of 2010 to develop a framework to guide custom project evaluation. In addition, Research Into Action staff conducted interviews with six BPA managers, three energy efficiency representatives, and five COTRs (contracting officer's technical representatives) serving BPA's utility customers to understand the current custom program risk mitigation activities, use or potential use of evaluation data, and custom program evaluation needs.

This report marks the culmination of these activities and provides an evaluation framework that BPA might use to develop a research agenda for custom energy efficiency projects.

[1] *Research Supporting an Update of BPA's Measurement and Verification Protocols*. Prepared for BPA by Research Into Action, Inc., Schiller Consulting, Inc., Left Fork Energy, Inc., Quantum Energy Services and Technologies, Inc., and Warren Energy Engineering, LLC. April 2, 2010.

2 OVERVIEW OF BPA'S EFFICIENCY RESOURCE ACQUISITION

This chapter briefly describes BPA's efficiency resource acquisition approaches and provides data for 2009 and 2010 (preliminary) on energy efficiency savings and expenditures, by savings estimation methods and market delivery approach.

EFFICIENCY RESOURCE ACQUISITION APPROACHES

Like most program administrators, BPA distinguishes between two broad categories of energy efficiency projects in its efficiency resource acquisition: relatively homogeneous projects whose energy savings can be known with considerable confidence and precision, independent of their application (that is, *deemed* or *calculated measures*); and diverse technologies whose savings depend on the site-specific application (that is, *custom measures*).

Unlike most program administrators, most of BPA's customers are electric utilities, most of which engage in energy efficiency activities with their customers – the electricity end-user.

Table 1 summarizes BPA's efficiency resource acquisition according to two dimensions – BPA's approach to savings estimation and to market delivery of efficiency. The subsequent subsections describe the concepts presented in the table.

Table 1: Examples of BPA Resource Acquisition by Savings Estimation Type and Market Delivery

Market Delivery Approach	Savings Estimation Methods	
	Deemed / Calculated	Custom
Utility Implementation	Residential HVAC Residential & Commercial Lighting Scientific Irrigation Scheduling Other	SA Utilities Custom NSA Utilities Custom Federal Custom
Third Party Implementation and Support	Residential Retail Energy Smart Grocer Performance Tested Comfort Systems	Energy Smart Industrial*
Emerging Technology	NA	Pilots

* BPA has contracted with Cascade Energy Engineering (CEE) to support utilities in the acquisition of industrial energy savings through the Energy Smart Industrial (ESI) program. CEE's support activities include project development, technical assistance, and savings assurance activities, including project M&V. The SA utilities, NSA utilities, and BPA's Federal customers can use CEE, BPA engineers, or their own engineers and consultants to develop projects or implement M&V activities.

Project Savings Estimation Methods

The efficiency projects that are easiest to administer are homogenous in the efficiency technology and application. Many of these projects have *deemed energy savings* (i.e., compact fluorescent lighting). Also in this broad category are project types that are homogeneous in the efficiency technology, but whose savings estimate is going to be driven by a few key parameters that may vary widely across applications, such as operating hours. The savings for these projects can be estimated with some degree of confidence based on the value of the parameter(s) for the application; these projects use *savings calculators*.

The Regional Technical Forum (RTF) establishes the deemed savings and standard protocols for specific measures. BPA conducts impact evaluations on programs and individual measures to develop realization rates and/or support the research required for deeming measures. These evaluations tend to be prioritized by savings for the region and for programs implemented for BPA by third-party contractors.

The second broad measure category comprises projects with diverse efficiency technologies and unique (site-specific) applications. These are *custom projects*, as each is unique in the exact equipment installed and its configuration, as well as the operating conditions at the site. Efficient commercial chiller systems are an example.

Market Delivery Structure

As a wholesaler of energy, BPA acquires most of its custom program energy savings by reimbursing its customer utilities on a dollars-per-kWh basis for energy savings they acquire through their efficiency programs; payments are capped at 70% of the project cost. BPA reimburses its customers through the *Conservation Rate Credit* and the *Energy Conservation Agreement*. Utilities must implement their programs and projects in conformance with the requirements set forth in BPA's *Energy Efficiency Implementation Manual*.

BPA reimburses most utilities – those with *standard* energy conservation agreements – for custom projects based on project-specific M&V plans and completion reports that have been approved by BPA engineers, and frequently have been developed with considerable BPA input.

Currently, four utilities have *nonstandard* energy conservation agreements with BPA: Seattle City Light, Tacoma Public Utilities, Snohomish Public Utility District, and Eugene Water and Electric Board. BPA refers to these utilities collectively as *nonstandard agreement utilities*, or NSAs (in contrast to the standard agreement utilities, or SAs). While these NSA utilities are required, as are all BPA's customers, to meet the conditions of the *Implementation Manual*, they are responsible for assuring custom project savings through their own M&V activity.

2009 AND 2010 EFFICIENCY SAVINGS AND EXPENDITURES

Table 2 presents 2009 data describing BPA's efficiency savings and expenditures by savings estimation approach and market delivery structure. Table 3 provides an analogous presentation

of preliminary 2010 data (provided by BPA in November 2010). In 2009, the standard agreement utilities generated just over half of total savings from activity equally divided between custom and deemed/calculated projects. Nonstandard agreement utilities generated 40% of total savings, with two-thirds of the savings resulting from deemed/calculated projects. This rough pattern is also apparent in the anticipated 2010 data, with standard agreement custom projects comprising a larger share of the total than previously.

Table 2: BPA's 2009 Efficiency Savings and Expenditures

Customer Type	Savings Estimation Type			
	Custom	Deemed / Calculated	Other	Total
	2009 Savings (average MW and Percent of Total)			
SA Utilities	7.85 22%	7.79 22%	2.85 8%	18.49 52%
NSA Utilities	4.19 12%	7.3 21%	2.85 7%	18.49 40%
Federal	2.99 8%	0 0%	0 0%	2.99 8%
Total	**15.03 42%**	**15.09 42%**	**5.48 16%**	**35.60 100%**
	2009 Expenditures ($ Million and Percent of Total)			
SA Utilities	7.32 19%	8.34 22%	1.49 4%	18.44 45%
NSA Utilities	4.30 11%	7.07 18%	1.06 3%	12.82 32%
Federal	8.68 23%	0 0%	0 0%	8.68 23%
Total	**20.30 53%**	**15.40 40%**	**2.55 7%**	**40.36 100%**

Table 3: BPA's Preliminary 2010 Efficiency Savings and Expenditures

Customer Type	Savings Estimation Type			
	Custom	Deemed / Calculated	Other	Total
2010 Savings (average MW and Percent of Total)				
SA Utilities	9.52 32%	7.07 24%	0.17 1%	16.76 56%
NSA Utilities	3.12 10%	4.73 16%	1.22 4%	9.07 30%
Federal	4.12 14%	0 0%	0 0%	4.12 14%
Total	**16.76** **56%**	**11.8** **39%**	**1.39** **5%**	**29.95** **100%**
2010 Expenditures ($ Million and Percent of Total)				
SA Utilities	9.32 23%	9.06 23%	0 0%	18.38 46%
NSA Utilities	3.53 9%	5.79 15%	0.48 1%	9.79 25%
Federal	11.49 29%	0 0%	0 0%	11.49 29%
Total	**24.33** **61%**	**14.85** **37%**	**0.48** **1%**	**39.66** **100%**

3 CUSTOM PROJECT RISK MANAGEMENT

This chapter discusses three approaches to reducing the risk of unrealized savings posed by custom projects.

RISK MANAGEMENT THROUGH M&V

BPA reduces the risk of unrealized savings from custom projects by requiring M&V plans and completion reports. As noted, for the standard agreement utilities, these plans and completion reports are typically completed by BPA engineers (although this is not a requirement). These M&V activities are typically embedded in the project development cycle. Thus, the evaluation team concludes that these activities, while managing risk, constitute program implementation activities and not evaluation activities.

RISK MANAGEMENT THROUGH AUDITS

BPA reduces the risk of unrealized savings from both custom and deemed projects by conducting annual or, for the largest utilities with a high volume of savings, semi-annual on-site audits. The COTR conducts the audits.

Before travelling to the utility, the COTR reviews the documentation supporting every project, which the utility has uploaded into the PTR, ensuring that quantities and prices are correct, that purchase dates are subsequent to applications, and so on. BPA has developed an *Excel* application that makes this task relatively straightforward. The COTR selects, in advance of the audit, projects he or she plans to review on-site – both custom and deemed projects – particularly large projects in savings or cost, projects representative of large quantities of savings, unusual projects, and other projects of note. The *COTR Desk Reference* guides them in this work. The COTRs, who are not engineers, confine their review to project documentation. They ask BPA engineers to conduct field inspections (at the end-user's site) of projects that BPA engineers have not inspected (post-completion) previously.

Although the COTRs conduct audits of all utilities receiving reimbursement for efficiency projects, these audits are the sole means by which BPA reduces the risk of unrealized savings from custom projects generated by NSAs, as these projects have not had BPA-approved M&V plans and completion reports. During the audit, the BPA engineer assisting the COTR reviews the M&V plans and completion reports for the projects the COTR identified for review.

As a result of the audits, projects for which the utilities have received reimbursement may become disqualified, or their savings may be adjusted. The reimbursement adjustments are made in the period following the audit. Typically, the utility has energy conservation credits restored to them for use in the subsequent period.

RISK MANAGEMENT THROUGH EVALUATION

Audits constitute a best practice in risk management, which BPA appropriately conducts. M&V constitutes a best practice in the management of risk from large custom projects, which BPA also appropriately conducts. However, the field of energy efficiency also embraces evaluation as a best practice in risk management and BPA is not engaged in the evaluation of custom projects.[2]

The COTRs undertake the efficiency audits from a perspective of contract compliance. They do not engage in evaluation activities. Evaluation is a systematic approach to assessment. In an evaluation of efficiency projects, when it is not possible to assess every project, then one relies on statistical inference to the population from a sample drawn according to specific principles. The COTRs may reduce or disqualify the savings of some projects, and these findings may lead them to cast a wider net and look at more projects than they originally intended, but they do not engage in statistical sampling or statistical inference.

In addition to supporting inferences within a population, evaluation supports inferences – of the development of implications – across time and across activities (such as measures and utilities). Evaluation provides the feedback necessary for adaptive management: for revising policies, developing procedures, identifying what works, what does not work, and why.

While BPA's engineers have developed expertise acknowledged throughout the region in custom efficiency projects and M&V, their M&V activities have not increased the expertise of BPA as an organization – through institutional learning – nor have they increased the region's understanding of what works in energy efficiency, how much energy might be saved, and how can it best be documented.

And while the COTR's audit activity may have corrected the majority of the inaccuracies in terms of dollars and energy savings, there is no feedback into BPA as an institution regarding such things as projects most likely to be problematic, successful applications of efficiency technologies that should be tried elsewhere, and requirements that should be included in subsequent contracts.

[2] BPA is evaluating some third-party programs and deemed measures that generate substantial savings.

4 EVALUATION FRAMEWORK

This chapter provides a framework for evaluation through a consideration of risk mitigation. It first discusses a generic framework and then applies the suggested thinking to generate lines of inquiry that BPA evaluators might pursue.

EVALUATION TO ADDRESS RISK IN PAST, CURRENT, AND PLANNED ACTIVITIES

Evaluation and assessment can address three broad critical questions with respect to the mitigation of risk associated with energy efficiency resource acquisition. These questions correlate to different time frames:

1. ***Past:*** **Have you attained your goals? What have you attained?**
2. ***Present:*** **Are you on track to attain your goals?**
3. ***Future:*** **How can you attain your goals?**

Table 4 illustrates how these three critical questions generate research inquiries whose answers would provide a basis for risk mitigation actions.

Table 4: Risks Associated with Program Activity in Different Time Frames

Time of Activity	Broad Risk	Appropriate Evaluation Activity	Illustrative Research Questions to Address Risk
Past	Have you attained your goals? What have you attained?	Impact Market Effects	• What were program impacts on kWh, kW, load shape? • How do these compare with planning estimates (realization rates)? • Do realization rates vary by measure, by type of end user? • What are net impacts (beyond naturally occurring conservation)? • What is the saturation of the measure or extent of adoption of the behavior? • Are project savings persisting?

Continued

Time of Activity	Broad Risk	Appropriate Evaluation Activity	Illustrative Research Questions to Address Risk
Current	Are you on track to attain your goals?	Process Market Research Impact (to a lesser degree)	• Is the rate of program activity on-track to meet program goals? • Is measure activity as anticipated? • Are program data bases documented clearly and capturing information sufficient to identify program participants, their projects, project status, and pre-project interactions with customers and trade allies? • Do we have a good understanding of the magnitude of projects in the pipeline? • Can program databases support impact, process, and market research? • What are initial program and measure impacts? • Is the equipment installed and working properly? • What barriers exist to efficiency that BPA might address? • What might induce customers and end users to do more (repeat projects, more comprehensive projects)? • Could a change in administrative, implementation, or reporting processes increase project activity?
Future	How can you attain your goals?	Market Research, Technical Potential	• What equipment/ appliances are currently in use and how efficient are they? • What is the energy savings potential? • What are the barriers to efficiency and what program elements might address them? • Who are all the types of actors affecting how energy is used in this application (example: designers, specifiers, operators, consultants, contractors, end-users)? • What would be effective upstream intervention with manufacturers and distributors? • What is customer and trade ally awareness of efficiency options and solutions? • Who are the market leaders and how might they be engaged?

LINES OF INQUIRY BPA MIGHT PURSUE FOR CUSTOM PROJECTS

Table 5 uses the past/present/future risk perspective and identifies lines of inquiry BPA might pursue for custom projects. Because BPA's custom project acquisition differs according to the

market delivery structure – and somewhat by the sector of the end-user – the table indicates the applicability of the line of inquiry to these different delivery structures and end-users. The table identifies one third-party implementer: CEE (Cascade Energy Engineering, which provides implementation support to the Energy Smart Industrial – ESI – program).

Table 5: Potential Lines of Evaluation Inquiry for Custom Projects

Question	End User				Customer			3rd Party
	C	I	A	F	NSA	SA	F	CEE
C = Commercial I = Industrial	A = Agricultural F = Federal Agencies				NSA = Nonstandard Agreement Utilities SA = Standard Agreement Utilities CEE = Cascade Energy Engineering			
PAST								
Are projects still installed and working?	✓	✓	✓	✓	✓	✓		✓
How well are CEE calculators functioning?		✓			✓	✓		✓
What are program administration costs?	✓	✓	✓	✓	✓	✓	✓	Known
Are custom projects cost-effective by sector (based on project cost)?	✓	✓	✓	✓	✓	✓		✓
What are project realization rates? (defined as RR from ex ante to ex post M&V – two estimates produced by implementation staff; from final M&V to evaluated – estimates produced by implementation staff compared with those from independent evaluators)	✓	✓	✓	✓	✓	✓		✓
What projects had audit oversight, and what did the oversight find?	✓	✓	✓	✓	✓	✓	✓	
…When a project's savings is adjusted during oversight, what are the implications for the rest of the utility's portfolio? Should the adjustment be limited to the single project, or should a sampling approach be followed, a realization rate (RR) generated, and that RR applied to the portfolio?	✓	✓	✓	✓	✓	✓	✓	
…When savings are adjusted, do the findings have any implications for measure/program processes for the utility, BPA, or the region? What? How might the learning be disseminated?	✓	✓	✓	✓	✓	✓	✓	

Continued

Question	End User				Customer			3rd Party
	C	I	A	F	NSA	SA	F	CEE
C = Commercial I = Industrial	A = Agricultural F = Federal Agencies	NSA = Nonstandard Agreement Utilities SA = Standard Agreement Utilities CEE = Cascade Energy Engineering						
PRESENT								
How does the M&V differ between CEE and non-CEE projects? Is CEE meeting BPA's soon-to-be-adopted M&V requirements?		✓			✓	✓		✓
How does the M&V differ between NSA, SA, and Federal projects? Are there sector-based variations within those?	✓	✓	✓	✓	✓	✓	✓	
How is CEE estimating energy savings? What is the opportunity to transfer knowledge to BPA?		✓			✓	✓		✓
What are the opportunities for improving CEE and ESI processes? How well is CEE working with utilities and end users to bring in projects?		✓			✓	✓		✓
What is the realization rate for CEE projects (impact analysis)		✓			✓	✓		✓
Why are utilities and end users pursuing incented efficiency projects? Are they satisfied? How can we encourage or support them in doing more?	✓	✓	✓	✓	✓	✓	✓	✓
What are common commercial custom projects? Can calculators, standard protocols, or deemed savings estimates be developed for any of these? Can BPA accept projects with wide variances in RR if the average savings is within x% (e.g., 10%) of expected savings?	✓	✓	✓	✓	✓	✓	✓	
How well do the Fed efforts fit into BPA programs? Does Fed get a "pass" on some rules? Should it? What are utility perceptions of the Fed efforts? Are Fed efforts sufficiently transparent?				✓			✓	
By what avenues does learning occur within BPA and the region (customers, end users, project developers) about various project types (e.g., commercial chillers, paper mill facilities)? How might information be better disseminated?	✓	✓	✓	✓	✓	✓	✓	✓
What are the best practices among utility programs? How might these be disseminated?	✓	✓	✓		✓	✓		
Are current systems sufficient to inform BPA on the magnitude and nature of projects in the pipeline? Does BPA have the feedback information it needs to ensure it is meeting its goals?	✓	✓	✓	✓	✓	✓	✓	✓

Continued

Question	End User				Customer			3rd Party
	C	I	A	F	NSA	SA	F	CEE
C = Commercial I = Industrial	A = Agricultural F = Federal Agencies				NSA = Nonstandard Agreement Utilities SA = Standard Agreement Utilities CEE = Cascade Energy Engineering			
PRESENT AND FUTURE								
Are the savings estimated in the 6th Power Plan consistent with what our programs are seeing?	✓	✓	✓	✓	✓	✓	✓	✓
FUTURE								
Where are the new opportunities – both emerging technologies and new deployment opportunities? What is their savings potential?	✓	✓	✓	✓	✓	✓	✓	✓
What is happening in the market? What are barriers to efficiency? What are market trends and pressures?	✓	✓	✓	✓	✓	✓	✓	✓

A APPENDIX: PLANNING TOOL

The team developed the following planning tool that may be of use to BPA as it develops a research agenda and seeks to prioritize issues to investigate.

Table A-1: Possible Framework for Considering Evaluation Activities

ENTITY	WEIGHT ($, aMW)	PAST ACTIVITY (what BPA acquired)		PRESENT (pipeline of savings)		FUTURE (attaining 6th PP goals)	
		Research Questions	Research Base (what is already known; with what confidence)	Research Questions	Research Base (what is already known; with what confidence)	Research Questions	Research Base (what is already known; with what confidence)
NSAs							
2nd Tier SAs							
3rd Tier SAs							
Federal							
CEE							
Other 3rd Party Implementer							