

Community Energy Efficiency Programs Best Practices – IT Solutions

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“Local Energy Alliances” or LEAs typically act as a “hub” or primary point of contact for the many constituents involved in the effective, large-scale implementation of energy efficiency programs: the community and community organizations, energy consumers in all market sectors, contractors, research interests, policy and advocacy organizations, the media, executive and legislative branches of government, utilities and their regulators, and financing organizations. All of these constituents have information of value to the programs, and all have appetites for information about them. One of the major responsibilities of the LEA is to make sure that these constituents have the means to share such information with the LEA and with each other.

This requires some form of information technology (IT). It may be simple and paper-based for smaller programs and highly sophisticated and automated for larger programs, but it is essential to meeting the following objectives:

1. To characterize and quantify local ee/re markets and allocate resources efficiently to them
2. To support the management of contractors, quality assurance, and customer relations
3. To administer financing
4. To measure real and verifiable energy/water savings and the resulting CO2 reductions and jobs created
5. To evaluate and document a successful process for building neighborhood-based energy-saving programs and their marketing and financing
6. To explain and publicize the results, the process for achieving them, and the testimony of participants (including other benefits like reliability, maintenance savings, comfort, property values, etc.)
7. To guide public policy, legislative, and regulatory changes
8. To support quality assurance and design variations in real time by feeding back results
9. To build and sustain revenue sources that will support continuing investment

All LEAs share these objectives. The scope and power of the IT system chosen to achieve them depends on the local context. The LEA should first determine what utility, government, or advocacy programs are already in place and serving these objectives, and how it can share their data (which are difficult to collect and interpret). Then a design fitted to local needs and budgets can be adopted.

Following is a description of a robust IT and M&V process that can be adopted in whole or in part, with assistance appropriate to each jurisdiction.

Any IT system should include a Database component that will (a) accommodate input of all variables pertinent to the Objectives listed above and (b) support inquiries and reports along any dimension of interest (e.g., customer data, locations, participation, designs, installations, contractors, dates, collaborators, consumption, demand profiles, customer impacts, financing, utility relationships, etc.). It should also include a calculation platform to turn input data into the results and reports desired.

In order for LEAs to reach scale and manage the interactions between customers, contractors, vendors, utilities, and their staffs, it is essential that they partner with a vendor that can effectively balance the various needs of these constituents and develop an IT system that is flexible, scalable, and secure. For purposes of this document, we have called such a system a “Business Process Management Information Technology Tool (BPM IT Tool).”

BPM IT Tools enable the LEA to measure and compare energy efficiency savings across their individual communities—sometimes on a neighborhood by neighborhood basis—as well as across other communities. Whole-building energy performance simulation programs using data from utilities allow residents and property owners to track the predicted versus actual energy savings in their homes or facilities. These programs store an ongoing flow of daily weather information and energy use profiles, and provide an easy way to store and compare multiple savings scenarios.

Benchmarking and tracking software enables LEAs or city governments to offer energy reduction incentive programs for homeowners, multi-family property owners, and other consumers. These incentives can be based on peer comparisons on the local or national level and provide a powerful tool for increasing consumer adoption of energy efficiency products. The BPMIT tool will also support “pay-for-performance” incentives, as discussed in the Marketing papers.

BPM IT Tools can also be used to more effectively communicate with the various constituents. For instance, if the LEA notices that the market penetration for a specific type of retrofit is low, they can push messages to the relevant customers alerting them of specific incentive programs that are available to increase adoption. Additionally, there is a continuous pipeline of commercially available new energy efficiency technologies and practices. The LEA can use the IT Tool to make sure that the community—both contractors and residents—are aware of the latest technologies and their effective applications.

Most organizations will want software with both offline and online capabilities (the ability to store/access data directly on an organization’s hard drive and to store/access data remotely from Web-based applications). In considering which BPM IT Tool is most appropriate for the LEA, the organization will need to look at what attributes are most important for the three key users: Consumers, Contractors, and the LEAs themselves.

1. Consumer (community member) interface:

The BPM IT Tool should be configured to allow consumers to easily and comprehensively examine the costs, benefits, and available incentives for sustainable projects; to find project

financing, incentives, and rebates; and to connect directly with vendors to implement their projects once they have been approved. In order to do so, it is recommended that the tool have the following attributes:

- A secure site where the user can feel comfortable uploading private information relating to energy use (utility and user-generated data) and loan applications.
- Access to educational materials, including articles, videos, podcasts, and links to relevant sites. Additional tools can be integrated to increase the communications between the consumers and the LEAs, contractors, and financing organizations, including discussion boards, Twitter feeds, maps tagged with a listing of completed projects, and blogs.
- Seamless integration with additional data sources, including utilities (gas, electric, and water), residential smart meters or commercial energy management systems, assessor databases/MLS, and the census.
- The ability to create individual or group-based goals for energy, water, or financial savings, and to develop plans to help the users achieve these goals. Consumption analysis and tips should reflect specific residences, appliances and usage patterns.
- The ability to compare energy savings across a specific subset of the LEA's population—neighborhood by neighborhood, for instance—in order to develop marketing campaigns such as competitions to increase customer adoption of energy efficiency technologies. This includes the ability to benchmark against local and national data such as the EPA's Home Energy Yardstick or Portfolio Manager.
- An e-commerce platform that allows customers to easily purchase relevant technologies.
- Tools which allow the consumer to more easily and efficiently interact with contractors, including:
 - Listings that rank contractors based upon pre-defined attributes, including overall customer satisfaction.
 - The ability to search for contractors based upon geography, availability, and expertise.
 - The ability to communicate directly with the contractors to schedule auditing appointments.
 - The ability to put jobs out to bid and to collect and rank bids.
 - Dashboard summary of job status and savings by contractor.
 - Customer satisfaction survey post-retrofit.
- Tools which allow the consumer to more easily and efficiently interact with potential financing organizations, including:
 - Easy, safe online applications for loans, grants, and credit card financing.
 - Secure loan payment options.
- A customizable skin that gives individual community groups the ability to easily build out their own sites based upon user interest or group affiliation. For instance, an individual development could create their own branded site and then use the site as a springboard to reach out to residents of the development and communicate with them about incentive programs, technologies, and latest news.
- An online energy survey and report. The consumer-facing report should be easy to understand and make clear where the opportunities for improvement lie. The report should also include clearly defined energy and financial savings. Additionally, it should include benchmarking information for peer groups that are established by the LEA.

Usage patterns, energy costs, comparison information and other valuable energy data should be displayed in an easy-to-digest graphical format.

- Calculators: loan payments, carbon, cool roof, and renewable energy.

2. Contractors:

The BPM IT tool should simplify the process of providing contractors with a list of real, financed project opportunities and enable easy communication between qualified consumers and contractors. In order to meet these needs, it is recommended that the tool have the following attributes:

- Tracking of available incentives and financing
- Read-out of market sector characterization and quantification
- Posting of customer and LEA requests for proposals
- Employment interactions (job postings, training, certifications)
- The ability to input data from audits via a mobile interface (handheld devices) or printable forms. The data input forms should be customizable, based on standards, and include environmental hazard and water audit questions. Data collected using the mobile interface should integrate with web-based databases. These tools should be flexible enough that they can also be used for community canvassing.¹
- Tools to more easily interact with consumers, including access to information that has been provided by home and business owners via the consumer interface, and the ability to email residential and commercial reports directly to consumers.
- Appointment scheduling function that includes geo-tagging/mapping. This should include not only initial audit scheduling, but also mentoring and quality assurance checks.
- Report generation (commercial and residential) that includes ROI and potential energy gains.
- Flexibility regarding applicability to either residential or commercial programs.
- The ability to bid online for qualified projects, including access to customer audit report data.
- Easy access to online training and support. Additional tools to facilitate communication between contractors, including discussion groups.
- Reports which include feedback regarding how the retrofit is performing (energy savings) through measurement and verification using IPMVP standards. (See the EMV section below.)
- Direct billing and the ability to collect account fees online.
- Ability to access community information and to track and benchmark performance against other projects.

¹ Some contractors and most ESCOs already have this capability, but it would be beneficial to integrate it in the BPMIT tool.

3. Program Administrator (LEA):

As the centralized organizing unit, the LEA can use the BPM IT tool to facilitate its overall processes and increase program efficiency. The tool enables them to track contractor work quality, measure and verify efficiency gains, develop outreach programs, monitor the efficacy of marketing campaigns, and track the effectiveness of their program against their peers. In order to meet these needs, it is recommended that the tool have the following attributes:

- Enable the LEA staff to monitor and track residential and commercial projects from initial marketing to audit scheduling to contractor selection to measurement and evaluation of completed projects.
- Automate marketing efforts by providing the ability to track and monitor click-through rates on the site or responses to email pushes; to generate targeted marketing campaigns based upon address, facility demographics, types of upgrades which have already been completed, etc.; and to develop an online community to share information (e.g., articles and videos) using social media tools such as discussion boards, Twitter feeds, blogs and Facebook. Mobile phone applications can also be developed and used to record information collected through door-to-door canvassing.
- Facilitate interaction with contractors, including the ability to monitor and verify project performance; to benchmark this performance against other contractors in the program; to provide training and certification; to track transactions between clients and contractors; to push out information regarding new products and services; and to review customer surveys on contractor performance.
- Provide the data and calculation capacity to measure and verify energy savings in accordance with generally-accepted M&V protocols
- LEAs can sometimes work as a licensed reseller for software that automates processes for the contractors. This provides an opportunity for additional revenue generation.
- The software should be flexible enough so that it can be reconfigured if necessary based on requirements of funders.
- Additional tools, including appointment scheduling, specific task management, rebate and incentive processing, and activity tracking, might be developed according to each LEA's needs.

It can take a considerable amount of time to customize available tools to individual LEAs. For instance, the process of on-boarding utilities, integrating their data, and weather normalizing must be done on a city-by-city basis. Development time can be anywhere from three to six months. Given the fact that many of the functions of the LEA—from marketing and outreach to partnering with contractors to uploading audit information—are dependent upon the successful implementation of the BPM IT tool, it should be a priority for organizations to swiftly select and contract with the appropriate vendor.

Data and Calculation Requirements for Measuring Savings and Jobs

Objective number 4 on page 1 is “to measure real and verifiable energy/water savings and the resulting CO2 reductions and jobs created.” This is an especially important function of the BPM IT tool, because of its public benefit impact. It is also an especially challenging function, because

of the computations involved. The following paragraphs describe data inputs, calculations, and M&V protocols for documenting verifiable results.

An essential early step in the program is to identify and begin collecting data that will support the IT process. For that purpose, a list of data is recommended below, organized by the objective it is intended to measure.

Objective: Record CO2 emission reductions, jobs created or retained, and other quantitative results

Data required:

- Energy consumption (electric and thermal, by source) and water use before and after installation—both utility meter readings and spot metering
- Metering data where applicable, by specific ECM, before and after installation (under comparable conditions and holding other variables constant)—e.g., infiltration before and after, by blower door; current draw of new vs. replaced appliances and HVAC; infrared readings of heat loss through walls and roof; lighting wattage
- Metered output of renewable-energy sources installed, by kWh, kW demand profile over time, and therms. Also metered input of any energy required by the source (e.g., pumping of hot water from solar thermal panels)
- List of measures taken by household or business
- Installation specifics: product/materials specifications; specific applications; local conditions and settings, internal and ambient
- Data on savings experience by measures taken, in comparable markets, calibrated by samples in Pilot neighborhoods
- Local energy source profiles for computing emissions
- Investment of public and private dollars in the installations
- DOE guidelines for jobs per dollar of investment, or other conversions

Calculations to be performed:

- Compute energy savings using applicable EM&V methods
- Convert energy savings by source into CO2 emission reductions
- Convert investment dollars into jobs created or retained, using DOE guidelines of jobs per dollar

Objective: Prove validity of the above records

Data required:

- Results of calculations under Objective 1

Calculations to be performed:

- Commissioning of the installed improvements by an independent engineer
- Validation of results using the EM&V Protocols (below)
- Both above to be on a statistically valid sampling basis

Objective: Evaluate and document the process

Data required:

- Testimony of customers, contractors, marketing and financing arrangers, City sponsors, and all key stakeholders, based on interviews
- Results from above calculations
- Comparable results from programs run by utilities, cities, and private sponsors elsewhere

Calculations to be performed:

- Construction of interview guides to facilitate data entry
- Definitions of quantifiable objectives
- Derivation of indices of satisfaction, results vs. objectives, results vs. achievements in comparable programs elsewhere

Objective: Explain and publicize results and processes

Data required:

- Outputs of above calculations
- Data base of media contacts, DOE and other Government agencies, professional journals, conferences, relevant memberships and interested parties

Calculations to be performed:

- Organization of contacts
- Applications for appearances and audiences
- Construction of outlines for articles
- Reconciliation of billing data (apparent savings) to measured savings

Objective: Support QA and design feedback

Data required:

- Tabulation of expectations
- Results that fall short of expectations

Calculations to be performed:

- Comparisons of results vs. expectations
- Reports of the independent engineer regarding commissioning data

Objective: To support sustainable revenue sources

Data required:

- Demand profiles before and after (demand-side data) and metered output of local generation (supply side data), to support participation in electric capacity markets
- Electric and thermal savings from which emissions reductions can be calculated

Calculations to be performed:

- CO₂ and other emissions for which markets exist, based on DOE standards
- Peak-hour-coincident demand reductions and renewable-energy outputs, in terms specified by the regional grid operator and utilities that will purchase such capacity “attributes” of electric savings

Protocols for Evaluation, Measurement & Verification

There are many recognized protocols, standards, and methods for evaluating, measuring, and verifying the performance of energy-efficiency and renewable-energy improvements. By far the

most often cited reference is the International Performance Measurement and Verification Protocol (IPMVP) published and periodically updated by Efficiency Valuation Organization, an international nonprofit organization that grew out of the original IPMVP collaborative. The IPMVP includes a separate volume devoted to renewable sources, but the metering of these is quite straightforward compared to the measurement of “savings.”

Other M&V manuals and guides are published by local utilities, some state energy offices (NY, CA), policy groups like the Regulatory Assistance Project in Vermont, and professional societies like ASHRAE and IEEE. They have some advantages in specialized uses (for example, peak-hour demand reduction proof), certain industrial and technical cases, dealing with ambiguities, tutorials and technical assistance, or local filings. Further references to available standards can be found on the Web at:

- <http://mnv.lbl.gov>
- www.wbdg.org/references
- www.aeecenter.org (various certifications)
- www.evo-world.org
- www.raponline.org

The IPMVP, however, is widely accepted and backed by many years of trial.

No protocol can entirely eliminate the element of judgment. “Savings” are necessarily a comparison of actual consumption (or demand) to what “would have been” absent the installation of energy-efficiency or renewable-energy improvements. The calculation of “what would have been” is often called the “baseline,” but nothing in this world is without change. Therefore the IPMVP offers guidelines for reasonable calculation but cannot “prove” savings. Further complicating this reality is the fact that consumers’ behavior changes, rates rise, weather varies, occupancy and use are not constant, and facilities age or otherwise depart from any precise baseline. Thus many participants will inevitably complain that their costs went up instead of down or their savings are not visible. The BPMIT tool recommended in this report tries to accommodate these realities by including issues of consumer satisfaction, evaluation of processes, and feedback of corrections.