DOE Voluntary Partnership Program with Utilities and Local Governments Supports the Design of New Data Access Solutions

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ABSTRACT

The Better Buildings Energy Data Accelerator (BBEDA) is a unique effort that has supported 22 pairs of local governments and their utility companies to help building owners gain access to their whole-building energy data. Municipal and Utility BBEDA Partners committed to develop streamlined and easy-to-use solutions to provide whole-building energy data, especially for multitenant commercial buildings, by the end of 2015. Readily available energy consumption data for the entire building enables the owner to make data-driven energy efficiency decisions. Traditionally, data access was difficult to implement due to technical barriers and the lack of clear value propositions for the utilities. During the past two years, BBEDA has taken a hands-on approach to overcome these barriers by offering a platform for the partners to discuss their challenges and solutions. Customized support was also provided to Partners building local strategies. Based on the lessons learned from BBEDA partners, a final toolkit was developed and includes documents that address key barriers and serve as a resource for the other cities and utilities attempting to establish whole-building data access. One document explores opportunities to apply whole-building data to various aspects of utility demand-side management (DSM) programs. BBEDA has been a catalyst for market transformation by addressing policy, engagement, and technical hurdles and arriving at replicable solutions to make data access a standard practice nationwide. As a result of best practices identified by the BBEDA, 18 utilities serving more than 2.6 million commercial customers nationwide will provide whole-building energy data access to building owners by 2017. This historic expansion of data accessibility will increase building energy benchmarking, the first step many building owners take to improve the energy efficiency of their buildings.

Importance of Energy Data Access

Across the nation, building owners and operators are measuring and tracking the energy performance of their buildings more than ever before. Known as energy benchmarking, this process helps building owners manage energy consumption, identify opportunities to improve energy efficiency, and quantify financial outcomes. Benchmarking has also been shown to increase customer participation in utility energy efficiency programs (NMR 2012). To conduct benchmarking in such tools as U.S. Environmental Protection Agency's (EPA's) ENERGY STAR® Portfolio Manager® (ESPM or "Portfolio Manager"), building owners need to know how much energy is used in the entire building. Yet, they are often prevented from accessing energy information for tenant-occupied spaces, where the tenant is the utility customer of record.

Specifically, building owners must request the energy consumption data from each tenant, aggregate the data for the whole building (unless the building is master-metered), and then upload the information into a benchmarking tool. Building owners frequently cite the inability to gather this data in a simple manner as a primary obstacle to benchmarking and improving the energy efficiency of their buildings.

In 2013, a handful of utilities were offering solutions that provided building owners with the information they needed to benchmark their buildings in a streamlined fashion. These solutions involved aggregating energy consumption information for all the meters within a building and providing the building owner with a single, "whole-building" energy consumption figure that protects the confidentiality of the building's tenants. The U.S. Department of Energy (DOE) witnessed first-hand that building owners participating in the Better Buildings Challenge and in the marketplace were facing this foundational data challenge. Building on the success of existing utility solutions, DOE launched the Better Buildings Energy Data Accelerator (BBEDA) in December 2013 to accelerate the adoption of best practice solutions for whole-building data access through a voluntary partnership program with local governments and their utilities.

The Better Buildings Energy Data Accelerator Program

The BBEDA was established to demonstrate low-cost, standardized approaches for providing energy data to building owners for the purpose of whole building energy performance benchmarking. These approaches also allow for reliable and secure utility aggregation of energy consumption data from multiple accounts to facilitate building benchmarking while protecting privacy.

By joining the BBEDA, local governments partnered with their local utilities and committed to provide whole-building data to building owners interested in benchmarking commercial and/or multifamily buildings. The diverse set of BBEDA local governments and utilities helped illustrate that whole building data access can be achieved regardless of the regulatory environment or the size of city or utility. Twenty-two city-utility pairs developed a number of technical approaches for providing whole building data access, models for stakeholder engagement, and replicable solutions for addressing policy and regulatory barriers.

Figure 1. Map of Better Buildings Energy Data Accelerator Partners (2013 – 2016).

Program Approach

The partners committed to three primary milestones when signing on to the program: 1. Convene local stakeholders (May 2014), 2. Design an approach to whole-building data access (December 2014), and 3. Provide whole-building data access to at least 20% of local building owners (December 2015). These milestones and public recognition events, such as the annual Better Buildings Summit, helped to drive progress within the voluntary partnership program construct.

The program was intended to support partners in their respective stages of the whole-building data access process and ability to meet these milestones. Four unique aspects of the BBEDA helped to drive toward successful outcomes on these milestones:

1. *The facilitation of peer-to-peer exchange, especially for utility partners*. More established partners were able to share their experiences with partners actively designing their systems.
2. *The public partner commitments to whole-building data access*. The partners and local stakeholders were able to leverage the public commitments to ensure local outcomes.
3. *Customized stakeholder engagement support to specific partner-pairs in coordination with national and local stakeholders.* The BBEDA team worked with a number of national and local strategic collaborators (e.g. U.S. Environmental Protection Agency, Institute for Market Transformation) to support partners in deploying their local strategy.
4. *The ability to create a national conversation on best practices and standard approaches*. The BBEDA team synthesized the experiences of the partners into best practices in standard approaches that other utilities and local governments can now employ.

The BBEDA program was designed and executed by the National Renewable Energy Laboratory (NREL) in conjunction with DOE and with support from ICF International and the Consortium for Building Energy Innovation (CBEI). The BBEDA team worked directly with each partner-pair throughout the course of the program to assess their needs and progress. This led to the team providing customized support, facilitating one-on-one peer exchange, but also provided valuable input to overall program strategy to develop shared partner resources. Three working groups were established to address specific barriers: 1. the technical aspects of aggregating and transferring utility data to building owners, 2. the policy and regulatory aspects of streamlining the provision of whole-building data while protecting the privacy of individual tenant data, and 3. building the right level of stakeholder support in the local community to enable whole-building data access solutions to be implemented.

BBEDA Partners performed well on Milestone #1 – *convene local stakeholders* and shared their initial experiences at a BBEDA workshop at the 2014 Better Buildings Summit. The BBEDA team also previewed a short document to start preparing the partners for Milestone #2 due at the end of 2014 – *design a streamlined approach for providing whole-building data to building owners*. This document outlined eight major decisions that utilities might need to make in designing their approach for whole-building data access and potential options for each decision. This document served as the basis for some of the BBEDA resources and best practices developed during the program The eight categories included the following topics: Mapping meters/accounts to buildings, Source of energy consumption data (utility system), Method of providing data to customers, In-house vs. vendor system development, Cost recovery, Authorization protocol for owner/user identity, Treatment of tenant consent for multi-tenant

buildings, and method of data transfer to/from a benchmarking tool (e.g., Portfolio Manager). Partner responses to Milestone #2 provided the BBEDA team with insights as to how partners were designing their systems, and what aspects were still not determined and might require support. A handful of partner-pairs were in active discussions with local stakeholders and the BBEDA team offered them additional assistance. By the end of the program, Partners that were able to meet Milestone #3 – *provide whole-building data access to at least 20% of local building owners* - or were on track to meet it by early 2017 were recognized at a final event in January 2016 and a BBEDA toolkit was subsequently published.

As a result of best practices identified by the BBEDA, 18 utilities serving more than 2.6 million commercial customers nationwide will provide whole-building energy data access to building owners by 2017. The most successful aspect of the program was the establishment of three primary best practice areas for addressing the most critical aspects of providing streamlined, aggregated whole-building energy consumption data to building owners for benchmarking. Eighteen BBEDA utilities are adopting at least 2 out of the 3 best practices in their implementations. The following sections illustrate the best practices that were identified during the course of the BBEDA and are based on partner experiences. Toolkit documents address the technical, policy, and stakeholder aspects of bringing a whole-building data access solution to a local community[1].

Best Practices for Developing a Stakeholder Engagement Strategy

BBEDA partners each developed different strategies to build support for whole-building data access solutions in their local communities. These stakeholder engagement strategies were synthesized into best practices in the BBEDA toolkit document, *BBEDA Stakeholder Engagement Strategy Guide* and specific experiences are relayed via case studies. A few of the highlights are included here.

The key concerns of primary local stakeholders can be summarized in Table 1. Each of these issues will be prioritized differently depending upon the specific stakeholders involved in unique data access stakeholder efforts. Table 1 below provides an indicative example of how typical issues might align with various stakeholder groups.

Table 1. Common Concerns of Key Stakeholders for Whole-building Data Access

Stakeholder		Typical Issues
Local Government		Ensuring compliance with benchmarking mandates (where applicable)
		Achieving energy efficiency policy goals, including transparency and performance improvement

[1] Better Buildings Energy Data Access Toolkit: Blueprint for Action: http://betterbuildingssolutioncenter.energy.gov/toolkits/energy-data-access-blueprint-action.

Building Owner		Obtaining access to energy usage data usage in order to successfully benchmark (regardless of voluntary or mandatory drivers)
Local Utility		Technical feasibility and cost of building and delivering a data access solution
		Fulfilling obligations regarding customer data privacy
Utility Regulator		Ensuring a balance between quality, reliability, and cost of utility service to customers
		Balancing legal requirements for data privacy against the need for data access
Consumer and Ratepayer Advocates		Ensuring that any costs passed on to consumer are reasonable, justified, and fair
		Ensuring that customer data privacy is not diminished
Regional/National Energy Efficiency Groups		Ensuring that the stakeholder engagement process and eventual system design is informed by best practices observed across the country, and consistent with broader market transformation goals
Energy Efficiency Service Providers/Vendors		Providing insight regarding the role that data access can play in identifying and driving actual energy savings projects
		Identifying the secondary market and workforce impacts of enhanced access to energy data
Local Colleges/Universities		Identifying value-added analyses that can be performed on large benchmarking data sets (enabled by data access)

A successful stakeholder engagement strategy will seek to identify the key stakeholders in each community that may have a role in local whole-building data access and assess their primary concerns. Approaches to local stakeholder engagement may be multi-faceted and must be designed to demonstrate the value proposition for data access to each core constituent. Based on the experiences of the BBEDA jurisdictions, the engagement strategies may be more informal and require less focus on demonstrating the value of whole-building data and addressing key concerns if many of the primary stakeholders are convinced of the need and their role in bringing data access to the local community. The stakeholder engagement process may be more focused on ensuring a successful implementation (e.g Seattle).

In other cases, a more formal approach may be needed, potentially in the form of a regulatory proceeding or a legislative process in order to gain the necessary policy support for whole-building data access (e.g. California). These more formal engagements can require more time and resources to reach resolution. Lastly, in some jurisdictions, a more coordinated, but

semi-formal approach may be needed to ensure that critical constituents are all given the information that they need to make informed decisions and the ability to provide input for potential solutions. Many of the BBEDA partners embarked on a semi-formal engagement strategy, where time and resources were devoted to educating local stakeholders on the basics and emerging best practices for benchmarking and data access as well as articulating the value proposition for specific constituencies. The BBEDA Toolkit document *Stakeholder Engagement Strategy Guide* illustrates these different approaches in more detail and also describes tools that can be used in each local environment to ensure a strong local government relationship with the utility, methods for expressing support from local industry members, and mechanisms for engagement and information dissemination.

Best Practices for Developing a Utility Approach to Whole-Building Data Access

Of the eight major considerations for developing utility systems laid out in Milestone #2, three emerged as being critical to designing a streamlined utility approach to providing building owners the data they needed to benchmarking their buildings. These best practices are discussed in more detail in the BBEDA toolkit document *Best Practices for Providing Whole Building Data – Guide for Utilities*. More detailed descriptions of each of the three critical issues and associated best practices are described below.

Mapping Energy Meters to Buildings

Many commercial and multifamily buildings have numerous energy meters serving different areas of the building, including tenant spaces. Utilities that provide whole-building energy consumption data to building owners must first be able to link those meters (or in some cases, the customer accounts) to each building. Although this may seem straightforward, in reality it is a challenge. Many utility customer information systems—the systems utilities use to bill customers—are not designed to track energy consumption at the building level, and may not be able to "map" individual meters to specific structures. Additionally, the addresses used by utilities to associate meters with buildings (known as service addresses) often differ from the physical street address for a building.

This issue has presented a significant barrier for many utilities considering whole-building data access. Figure 1 shows the difference between traditional billing practices and the new demands being placed on utility data systems to aggregate meters at the building level.

Best Practice

Utilities should develop an internal process to map meters to buildings, leveraging building owners or customers to validate results or to provide specific information that only they can provide. The exact process used by a utility will depend on the capabilities of their existing customer information and metering systems, but might include:

- Run queries in their customer systems to identify all service points, accounts, or meters associated with the addresses of individual buildings. Building owners helped utilities identify cases where a building had multiple street addresses, an issue that occurs frequently in some jurisdictions.
- Match customer account information with external data sets, such as tax assessment information, to link accounts to physical addresses.

- Use geographic information system data to match meters to a specific geographic location (typically, only newer meters will have this capability).

Building owners or customers will need to provide information to initiate the mapping, and then ultimately validate the results. When implementing new customer information systems, utilities should ensure meter mapping is addressed early in system design.

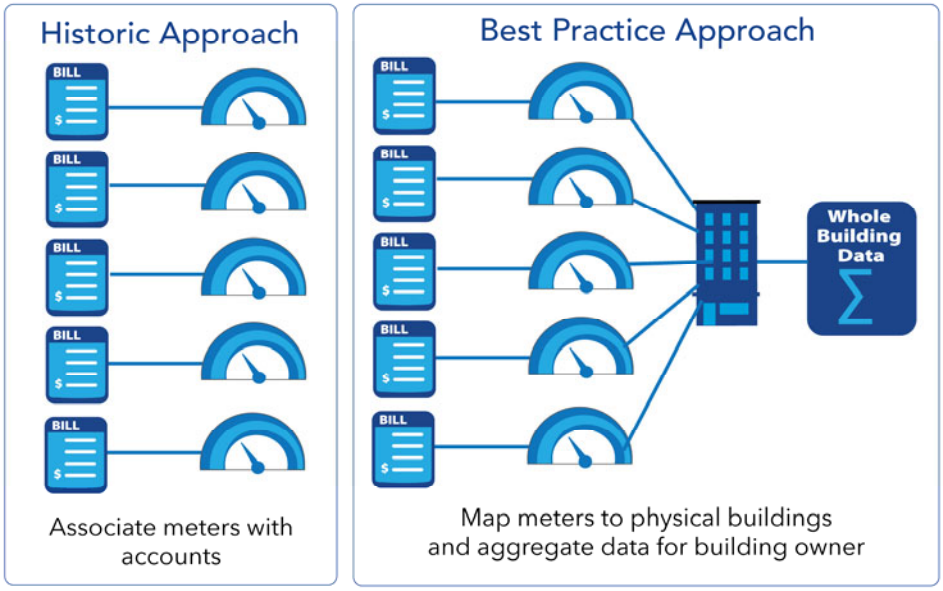

Figure 2. Mapping Meters to Buildings

Simplifying the Tenant Authorization Process

For buildings that have separately metered tenants, utilities must decide whether authorization is needed from each tenant—the utility customers of record for those meters—before providing the building owner with whole-building energy usage data. Some large buildings may have 50 or more separately metered tenants within the structure, and requiring authorization from each tenant can create significant administrative, time, and cost barriers for both utilities and building owners. However utilities decide to handle tenant authorization, the solution should balance the need to streamline data access with the need to protect customer data privacy. Many utilities require tenant authorization for all data requests involving a tenant's energy usage, while others are adopting practices that other utilities have used to reduce authorizations while maintaining customer data privacy.

Best Practice

Most BBEDA utility partners are using, or are considering using, aggregation thresholds that only require tenant authorization if aggregation may not sufficiently mask the energy usage of individual tenants. Most BBEDA partners have set aggregation thresholds between two and five tenants—meaning that individual tenant authorization is necessary in cases where the number of tenants in a building falls below the threshold. Additionally, some utilities are using a second threshold to ensure that the energy usage of any individual tenant does not account for most of the aggregated energy usage total. These thresholds are often set between 50% and 80% of the total. The BBEDA toolkit document *Guide to Data Access and Utility Customer Confidentiality* provides more discussion on this issue and a summary of utility aggregation threshold approaches.

Streamlining the Transfer of Data into Benchmarking Tools

Increasingly, building owners are seeking more efficient ways to input energy data into their benchmarking tools. Manually collecting, organizing, and uploading these data is a barrier to benchmarking for many building owners, and is also known to cause errors in data entry that affect benchmarking results.

Table 2. Summary of BBEDA Whole-Building Data Access Systems

Utility No.	Utility	City(ies)/District	Utility-Led Mapping Meters[1]	Streamlining Tenant Consent[2]	Automating Data Transfer[3]	Implementation Timeframe
1	Austin Energy	Austin	No	Yes	No	Implemented
2	Eversource	Boston, Cambridge	Yes	Yes	No	Implemented
3	ComEd	Chicago	Yes	Yes	Yes	Implemented
4	SDG&E	Chula Vista, San Diego	In Progress	In Progress	Yes	2017
5	AEP Ohio	Columbus	Pilot	Pilot	Pilot	Pilot in 2016
6	KCP&L	Kansas City	Waiting for approval from MO PSC	Waiting for approval from MO PSC	Waiting for approval from MO PSC	2017
7	LADWP	Los Angeles	In Progress	In Progress	In Progress	2017
8	So. Cal. Gas	Los Angeles	In Progress	In Progress	Yes	2017
9	Xcel Energy	Minneapolis	Yes	Yes	Yes	Implemented
10	National Grid	New York City	Yes	Yes	No	Implemented
11	Orlando Util. Com.	Orlando	In Progress	In Progress	In Progress	2017
12	PECO	Philadelphia	Yes	N/A[4]	Yes	Implemented
13	Rocky Mtn. Power	Salt Lake City	No	Yes	Yes	Implemented
14	Questar Gas	Salt Lake City	No	In Progress	In Progress	2016
15	PG&E	San Francisco	In Progress	In Progress	Yes	2017
16	So. Cal. Edison	Santa Monica	In Progress	In Progress	Yes	2017
17	Puget Sound Energy	Seattle	Yes	Yes	Yes	Implemented
18	Pepco Holdings	Washington, DC	No	Yes	Yes	Implemented

KEY: Yes; In Progress; Pilot; Waiting for approval from MO PSC; No

Customers receive their utility data in a range of methods and formats, including paper utility bills by mail, downloadable PDFs or other electronic files, the Green Button XML format, online Web portals, and email. This variety is reflected in how building owners collect and input

energy information into benchmarking tools, including the EPA's ENERGY STAR® Portfolio Manager®. Typically, energy information can be entered into Portfolio Manager in three ways:

- **Manual entry:** Energy information from paper or electronic utility bills is manually input into Portfolio Manager by building owners.
- **Spreadsheet upload:** Energy information is formatted into a spreadsheet and uploaded into Portfolio Manager by building owners.
- **Fully automated:** Energy information is delivered securely from a third-party system directly into Portfolio Manager using an application program interface (API), replacing manual input by building owners (see Figure 3).

When manually entering data or using spreadsheets to upload data, energy consumption values must be extracted from utility bills. Fully automating the process offers a more elegant approach. Portfolio Manager web services enable utilities to transfer energy data directly from their systems into Portfolio Manager on an ongoing basis, eliminating the need for manual input by customers. EPA provides technical support to utilities who want to use web services as part of their data access solution. For more details on EPA's Portfolio Manager web services, see *http://portfoliomanager.energystar.gov/webservices/home*.

Best Practice

Automating the transfer of whole-building energy consumption data to benchmarking tools, including EPA's Portfolio Manager via web services, is a best practice among BBEDA partner utilities. It provides significant value to building owners and can help utilities reduce their workload gathering and sending data to building owners by automating the process.

Table 2 summarizes BBEDA partner adoption of the three main best practices for developing a utility approach for whole-building data. The full green circles indicate that the best practice has been adopted. Half full indicates that implementation is in progress, and red indicates that the best practice was not adopted. The yellow diamonds for Kansas City Power and Light indicate that they will adopt the best practices when they receive approval from the Missouri Public Utilities Commission.

Unlocking value for utilities

Utilities may consider the provision of whole-building energy consumption data as primarily a customer service; however, the potential for utilities to also derive value from whole-building data access systems and tp participate in local benchmarking efforts was explored in the BBEDA. Utilities design systems to provide whole-building energy consumption data to property owners to facilitate energy benchmarking. Both of these outcomes – whole-building energy data and benchmarking – represent new datasets that were previously unavailable to most utilities and could provide value to utilities also designing and executing energy efficiency programs.

Whole-building energy datasets

To provide whole-building energy data, utilities had to comprehensively map individual energy meters and/or customer accounts to physical addresses within their customer information systems. This change in practice creates a new level of visibility for utilities into how energy is consumed within their service territories (see Figure 2). Whole-building energy datasets can help

contextualize energy data flowing from individual meters, enabling utilities to assess how changes in equipment or operation at the building-level impact all the meters within a given structure. Utilities can assess whole-building datasets at different time intervals, including monthly or yearly, or even daily, hourly, or in shorter increments, if they have advanced meters.

Benchmarking datasets

Downstream of whole-building energy datasets, benchmarking datasets are creating even greater energy performance profiles of buildings. Data from the EPA's ENERGY STAR® Portfolio Manager™ benchmarking software tool includes building-level information on energy consumption by fuel type; annual greenhouse gas emissions; site and source energy use intensity (the energy used per-square-foot); an energy efficiency "score" relative to the efficiency of similar facilities; property characteristics such as size and vintage; occupancy information; use types for specific spaces within the building; and many other data points. This information can provide utilities with tremendous insight into the physical and operational characteristics of buildings, and how those characteristics shape energy consumption patterns.

Utilities can gain access to benchmarking datasets internally or externally. A utility that uses EPA's Portfolio Manager web services to automatically transfer energy consumption data into Portfolio Manager can also access benchmarking data for those Portfolio Manager accounts. If a utility isn't using web services (or even if it is), it can access benchmarking datasets externally where state and local governments require the public disclosure of benchmarking information, or by working directly with building owners to gain voluntary access. Building energy datasets that are disclosed through state and local government policies may also contain other information that is useful to utilities, including tax-assessor data and whether the building owner has complied with the benchmarking requirement.

Data opportunities beyond benchmarking

BBEDA utility partners helped identify five opportunities to apply whole- building energy and benchmarking datasets internally to achieve greater innovation, reduce administrative costs, and deliver outcomes more effectively in their energy efficiency program portfolios.

Customer Engagement, Segmentation, and Targeting

Whole-building energy and benchmarking datasets are being used by several utilities to deliver their existing energy efficiency programs more effectively. In some cases, utilities are using these datasets to gain a deeper understanding of energy efficiency opportunities across their service territories, and augment their marketing operations by targeting programs to customers based on new intelligence. In other cases, utilities are using whole-building data access platforms to actively engage with new and existing customers, helping build a pipeline of customers who may be interested in enrolling in energy efficiency programs. In both cases, these data applications can help a utility deliver energy efficiency more effectively – and help achieve statewide energy efficiency targets – while decreasing transactional and marketing costs.

Commonwealth Edison, which serves the greater Chicago area, uses its whole-building data access system – called the Energy Usage Data System (EUDS) – as a customer gateway into its energy efficiency programs. Customers that use EUDS to benchmark their buildings are then encouraged by the utility to identify opportunities to improve energy efficiency and take advantage of energy efficiency rebate, incentive, and other programs.

Southern California Gas (SoCal Gas) is planning to use its whole-building data access system – called Energy Advisor – to help identify the most relevant energy efficiency programs for its multifamily customers. Energy Advisor will automatically send whole-building energy data to a customer's Portfolio Manager account, and then generate a customer report that features benchmarking information along with customized energy efficiency recommendations. Eventually, SoCal Gas may extend this offering beyond the multifamily sector.

Additionally, Seattle City Light (SCL), the City of Seattle's municipal utility, is working with city officials to use benchmarking data generated by Seattle's benchmarking ordinance to promote customer participation in its energy efficiency programs. Building owners that are required by the ordinance to benchmark are sent an "Energy Performance Profile" by the City summarizing the energy consumption of the building, and the building's performance relative to Seattle peer buildings and national peer buildings. The City shared benchmarking data from 2013 and 2014 with SCL to identify the multifamily and office buildings that would benefit most from participating in SCL energy efficiency programs. For those SCL customers, the report suggests measures, incentives, and programs that can help reduce energy costs. The report was also customized based on a customer's prior participation in SCL programs.

Large-Scale Planning and Analysis

Similar to customer targeting, utilities can use whole-building energy and benchmarking information to help plan and evaluate the potential outcomes of energy efficiency programs across their service territories during program development. Building data points such as energy usage intensities, year of construction, and use type can help utilities perform energy efficiency analyses that are both broader and deeper than traditional intelligence allows.

Calibrated Energy Modeling

Whole-building energy and benchmarking information can be used to make building energy models more accurate. Energy modeling is already used by some utilities to predict the energy savings potential from conservation and efficiency measures. While these models are a good foundation for analysis, they become more accurate – and provide greater confidence to utilities about outcomes – when actual building characteristics and performance information are used to test and improve modeling assumptions. This process is known as model calibration. Utilities can use whole-building energy and benchmarking information to perform this calibration. Whole-building energy data can be integrated into energy models, replacing assumptions about energy consumption. Similarly, building characteristics drawn from benchmarking data can replace assumptions about the structure and systems within a building.

Advanced Measurement and Verification

Traditional measurement and verification (M&V) methods for energy efficiency programs rely on deemed savings, or savings estimates based on engineering-oriented methods. But that is changing as more information on actual building energy performance becomes available. Whole-building energy information can be used in M&V, providing an empirically based approach to measuring results. Lawrence Berkeley National Laboratory recently tested 10 empirically based M&V methods for accuracy and ability to predict the impact of energy efficiency measures on a building (Granderson et al. 2015). All ten methods performed well, with prediction failure rates ranging from 0% to 10%. Some utilities are already leveraging whole-building energy and benchmarking information in M&V through initiatives that link incentives

and rebates to post-project building performance, such as Pay for Performance pilot programs run by utilities in New Jersey, California, and other states.

Life-Cycle Building Performance Tracking

Whole-building energy and benchmarking data can enable utilities to track the energy performance of a building over the course of its useful life, rather than simply before or after an efficiency project is completed. This type of historical tracking can indicate the overall effectiveness of utility energy efficiency programs over time, including the degradation of energy savings, and when buildings need additional energy efficiency work.

Puget Sound Energy (PSE) has enabled its customers to track the energy consumption of a building over time using its whole-building data access system, MyData. PSE customers can view changes in building performance and estimate savings attributable to specific retrofit or operations and maintenance activities. PSE energy efficiency program managers are using this capability to evaluate the effectiveness of their programs.

Conclusion

These and many other best practices, lessons learned, and case studies are captured in more detail in the BBEDA Toolkit, and will enable other utilities and communities to learn and benefit from the work of the Accelerator. The BBEDA was a successful example of a DOE voluntary partnership program with local governments and demonstrating that whole-building data access can be a standard practice at utilities across the country. Twenty BBEDA partner-pairs will have implemented utility systems by early 2017 that incorporate at least two of the three best practice areas (see Table 2). These utilities represent at least 2.6 million commercial customers nationwide. This historic expansion of data accessibility will increase building energy benchmarking, the first step many building owners take to improve the energy efficiency of their buildings.

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