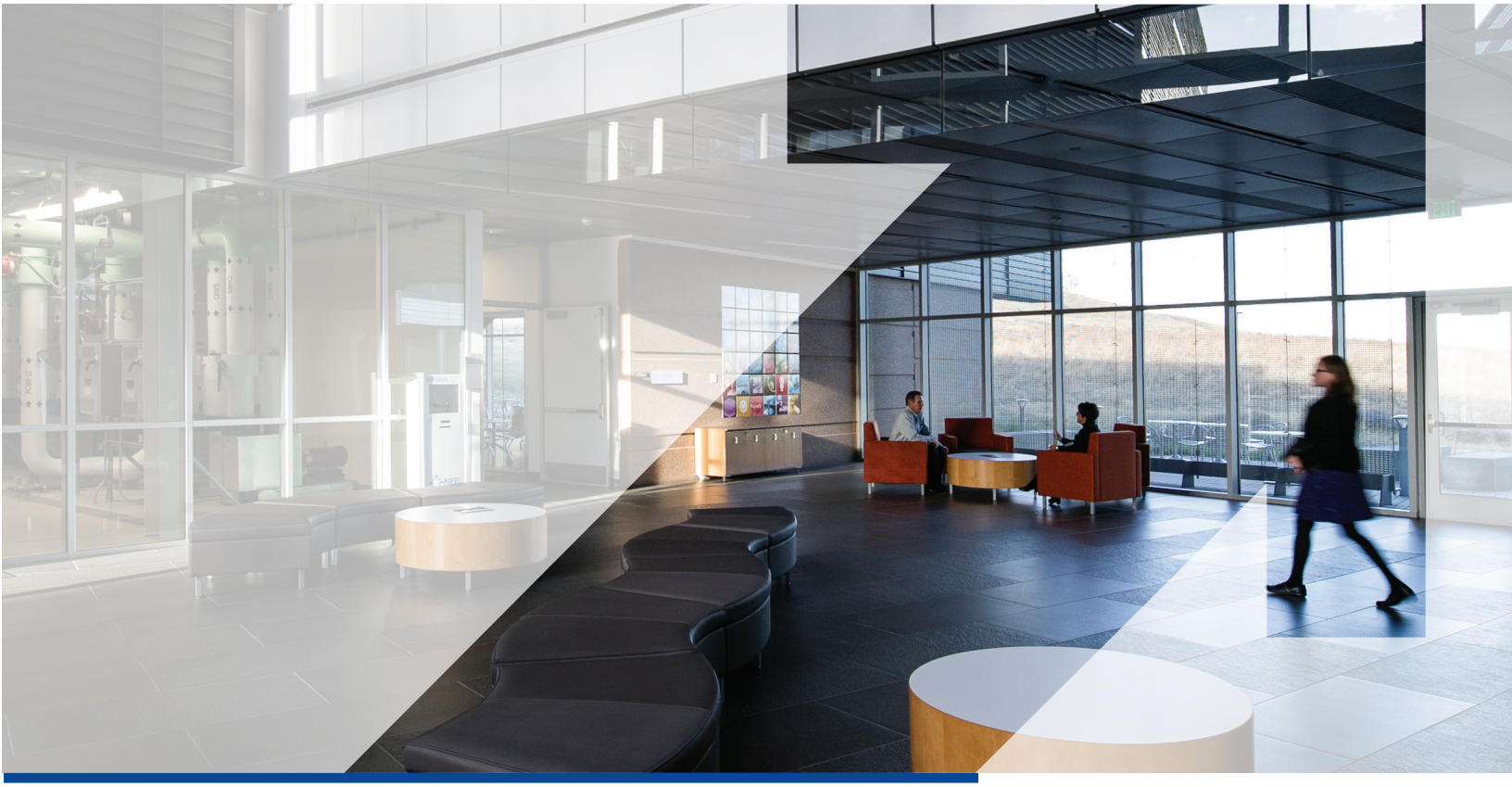
Better Buildings®
U.S. DEPARTMENT OF ENERGY

Energy Data Accelerator

# Beyond Benchmarking: Unlocking Value for Utilities



U.S. DEPARTMENT OF ENERGY

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Cover photo by Dennis Schroeder / NREL

## About the Energy Data Accelerator

The U.S. Department of Energy's Better Building Energy Data Accelerator (BBEDA) was a two-year partnership with cities and utilities to improve energy efficiency by making energy data more accessible to building owners. As a result of best practices developed by partners in this Accelerator, 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 energy efficiency.

*Beyond Benchmarking: Unlocking Value for Utilities* is part of the Energy Data Accelerator Toolkit, a collection of resources drawn from partners. By sharing how these partners overcame technical and policy barriers to whole-building energy data access, the Toolkit enables other communities to benefit from the work that has been done and foster the replication of these best practices throughout the country.

## Introduction

This document helps utilities identify new, untapped datasets that are emerging related to the energy performance of buildings, and how this information can be applied to expand market intelligence and create business value. The content of this document is drawn from the experiences of multiple BBEDA utility partners that have successfully developed whole-building energy data access solutions.

Supported by the work of the BBEDA, many utilities are now offering, or are in the process of offering, solutions that provide building owners with information to conduct benchmarking. These solutions commonly involve aggregating energy consumption information for all the meters within a building, and providing the building owner with a single, "whole-building" energy consumption figure.

These solutions are tremendously valuable to utility customers by enabling benchmarking, but they can also create direct value for utilities. As summarized in Key Takeaways, this document identifies how benchmarking information and whole-building energy datasets can strengthen utility energy efficiency programs.

### KEY TAKEAWAYS

- Whole-building energy and benchmarking information create new datasets and opportunities for utilities to improve energy efficiency program delivery.
- Utilities can use these new datasets in the following ways:
  1. Support customer engagement, segmentation, and targeting to drive deeper savings while reducing program costs.
  2. Strengthen energy efficiency planning and analysis on a market-wide level.
  3. Calibrate building energy models to improve certainty that energy savings predictions are accurate.
  4. Pilot advanced measurement and verification methods that can lead to innovative initiatives, such as Pay for Performance energy efficiency programs.
  5. Track the energy performance of buildings over time, providing a truer measure of program effectiveness.
- Many utilities are in the initial stages of assessing how to identify and apply whole-building energy and benchmarking datasets, and this area is evolving rapidly.

## Identifying New Information

Utilities already have vast amounts of information on energy consumption within their service territories drawn from individual energy meters within buildings and other structures. Yet, many utilities lack the capability to comprehensively link meters to specific buildings. They are able to track and assess energy consumption trends at the meter level, but not at the building level – the level at which many energy efficiency projects and practices that impact energy consumption are implemented.

As part of their participation in the BBEDA, utility partners designed new 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.

### 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. Figure 1 illustrates this change in practice, which creates a new level of visibility for utilities into how energy is consumed within their service territories.

Whole-building energy datasets can help contextualize energy data flowing from individual meters, enabling utilities to assess how changes in eq uipment 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.

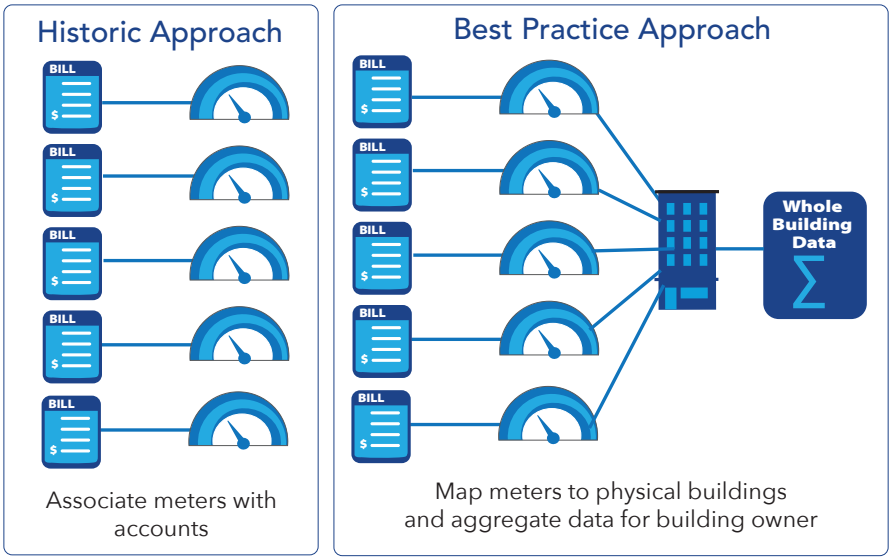


**Figure 1. Meter Mapping**

## Benchmarking datasets

Utilities can gain access to benchmarking datasets internally or externally. This information can provide utilities with tremendous insight into the physical and operational characteristics of buildings, and how those characteristics shape energy consumption patterns.

Benchmarking datasets (e.g., produced within EPA's ENERGY STAR® Portfolio Manager™) offer detailed energy performance profiles of buildings. Data from Portfolio Manager 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.

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 provides a more complete picture of the building, including tax-assessor data and the whether the building owner has complied with the benchmarking requirement.

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### Standard Energy Efficiency Data (SEED) Platform

Developed by DOE, the Standard Energy Efficiency Data (SEED) platform is a software database that utilities, state and local governments, private companies, and other organizations can use to collect, aggregate, store, and share large volumes of building-related information. Utilities can use this open-source platform to organize new data on buildings, or to work with other parties to access information in their SEED Platform databases. Learn more at http://energy.gov/eere/buildings/standard-energy-efficiency-data-platform.

## Data Applications 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. These opportunities are evolving rapidly as more utilities offer whole-building energy data to their customers and gain access to benchmarking datasets. They include:

- **Customer Engagement, Segmentation, and Targeting**
- **Large-Scale Planning and Analysis**
- **Calibrated Energy Modeling**
- **Advanced Measurement and Verification**
- **Life-Cycle Building Performance Tracking**

### 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.

**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

### Seattle Score Card

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 is 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 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.

An example of this type of large-scale analysis is the Customer Optimization for Furthering Energy Efficiency (COFFEE) project, developed jointly by **National Grid** and the National Renewable Energy Laboratory (NREL). COFFEE evaluates the energy savings potential of bundles of energy-conservation measures in portions of National Grid's Massachusetts service territory. The project integrates National Grid's customer data and DOE's OpenStudio energy modeling platform to automatically create and calibrate building energy models, providing National Grid with new market intelligence on a vast scale. As a result, National Grid gains visibility in areas such as energy efficiency opportunities and demand-response potential before deploying programs to customers.[1]

### 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 energy efficiency improvement 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 model assumptions about the structure and systems within a building to improve accuracy.

### 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. These approaches are changing as more information on actual building energy performance becomes available.

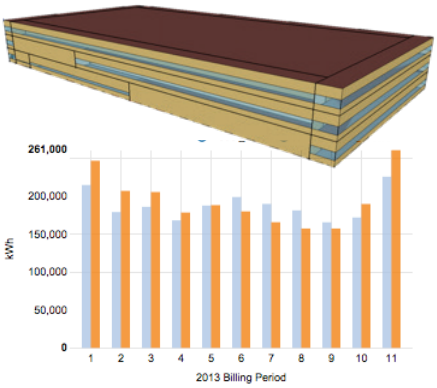
Whole-building energy information can be used in M&V, providing an empirically based approach to measuring results. Lawrence Berkeley National

[2] The OpenStudio platform is open source and freely available, but the COFFEE cloud application is not currently available publicly.

## Large-Scale Analysis

The Customer Optimization for Furthering Energy Efficiency (COFFEE) project, led by National Grid and the National Renewable Energy Laboratory, enables National Grid to evaluate the savings potential of bundles of energy-conservation measures before deploying new programs to customers. COFFEE automatically constructs and calibrates building energy models from high-level data including:

- Whole-building energy consumption
- Address
- Size
- Number of floors
- Vintage
- Building use type
- Retrofit rebate history




Learn more at http://www.nrel.gov/docs/fy16osti/65919.pdf.

Laboratory recently tested 10 empirically based M&V methods for accuracy and ability to predict the impact of energy efficiency measures on a building. All 10 of these methods accurately predicted energy efficiency impacts at least 90% of the time.[2]

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.

**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.

**Xcel Energy** has also been able to track the performance of buildings that participate in its Energy Design Assistance (EDA) programs. Xcel partnered with NREL to create the Energy Design Assistance Program Tracker (EDAPT), a web service that integrates with OpenStudio modeling tools to reduce program costs and improve the consistency of programs that incentivize beyond-code energy performance for new construction and existing buildings. EDAPT automates program and project-level reporting, approval notifications, and model quality checking to streamline program administration and engineering review.[3] Whole-building energy consumption data can be used to track the actual performance of buildings that have been designed through Xcel's EDAPT program.

[3] Assessment of Automated Measurement and Verification (M&V) Methods. Available at: *http://eis.lbl.gov/pubs/lbnl-187225.pdf*.
[4] EDAPT is being rolled out for Austin Energy and the Energy Trust of Oregon, and it is now available to other utilities. A process will enable implementers to offer EDAPT to their utility clients. Learn more at *https://eda-pt.org/*.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