

# Commercial Building Benchmarking: Will They Manage It Once They've Measured It?

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## ABSTRACT

This paper describes results from a study of benchmarking of commercial buildings using ENERGY STAR® Portfolio Manager by California commercial customers, and discusses the implications of the study for other states and utilities aspiring to meet commercial energy efficiency goals with benchmarking. The findings provide evidence to support the theory behind Portfolio Manager that the understanding of building energy use provided by the tool increases the chances that decision-makers will pursue energy efficiency opportunities for their building(s). Among a subset of customers who registered for utility benchmarking workshops and benchmarked with Portfolio Manager, benchmarking resulted in subsequent building energy management actions and energy efficiency improvements in buildings. Benchmarking was associated with utility program participation. There were tangible energy savings from benchmarking; a substantial portion of the savings was associated with utility programs; and it should be possible to measure these savings. The research showed low levels of awareness of benchmarking among California utility customers who have not taken a benchmarking workshop. About one-half of workshop participants who benchmarked were found to be undertaking the kind of monitoring and re-benchmarking the theory leads us to expect. One of the primary ways that customers reported using results from Portfolio Manager was to help identify energy efficiency opportunities in their buildings, but the tool is not designed to identify specific energy-saving opportunities within buildings. Benchmarking was found to play a role in commercial real estate business among California customers who benchmarked. A substantial percentage of the benchmark scores and EUIs obtained for this study appeared to be inaccurate, and the paper suggests some possible reasons and solutions.

## Background and Objectives

As recent legislation indicates, California is looking to the benchmarking of buildings as a vital tool for improving the energy efficiency of a wide variety of commercial and government buildings. For example, California Assembly Bill 1103 (AB 1103) mandates disclosure of commercial building energy usage data and the previous year's ENERGY STAR® Portfolio Manager (Portfolio Manager) benchmark score to prospective buyers, prospective lessees, and lenders under certain circumstances (AB 1103 2011). San Francisco recently passed an ordinance requiring owners of commercial buildings of at least 10,000 square feet to conduct an energy audit every five years and benchmark the energy performance annually (Guevarra 2011). Decision 09-09-047 of the California Public Utility Commission (CPUC) directs the four California investor-owned utilities (IOUs) to offer support for customer benchmarking of commercial buildings and states that the CPUC "enthusiastically support[s] increased attention to

‘benchmarks’ as a way to both inform and motivate building owners to undertake energy improvements” (CPUC 2009).

The assumption behind Decision 09-09-047 and other California benchmarking legislation is that by providing building owners with information about the energy use of their building(s), the owners will be motivated to undertake energy improvements and will follow through on these improvements. Previous research suggests, however, that the provision of information through benchmarking does not necessarily motivate building owners to take actions to save energy in their buildings, even when offered in conjunction with a utility program (Vaidya et al. 2009). As part of a process evaluation of the IOUs’ efforts in support of benchmarking, in 2011 the CPUC set out to explore several of these assumptions, and to assess whether benchmarking leads to energy savings from increased attention to building energy management—in short, whether customers will manage their buildings more actively once they have measured energy intensity through benchmarking. The CPUC also set out to understand the degree to which California utility customers are benchmarking buildings; how these customers are using benchmark scores; whether savings from energy management changes or energy efficiency measures that were influenced by benchmarking are measurable; and how important benchmarking is to the marketplace.

This paper describes the results from a recent study conducted by NMR Group and Optimal Energy for the California Public Utilities Commission that sought to address these and related topics (NMR Group Inc. & Optimal Energy, Inc. 2012).<sup>1</sup> The paper closes by discussing the implications of the study for other states and utilities aspiring to meet commercial energy efficiency goals with benchmarking.

## Research Approach

In order to satisfy these objectives, between August and December of 2011 the evaluation team conducted qualitative and quantitative research with utility initiative staff, stakeholders, and initiative participants and non-participants. The qualitative research included in-depth interviews with 26 individuals representing initiative staff, the U.S. Environmental Protection Agency (EPA), key benchmarking stakeholders, and utility commercial customers. The quantitative research included telephone surveys with initiative “participants” and “non-participants.”

Initiative participants were defined as individuals, including but not limited to employees of utility end-use customers who participated in a utility benchmarking workshop between January 1, 2010 and September 13, 2011. Participants were sampled randomly by organization from a listing of workshop registrants from 1,884 organizations during this period. The survey completed interviews with 127 of these respondents representing as many organizations. Respondents to the participant survey were subdivided into three groups and results were compared for each. Table 1 shows the three groups, the total number of respondents in each group, and the associated sampling error at the 90% confidence level. In this paper, the terms “participants” and “workshop participants” or “workshop registrants” are used interchangeably.

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<sup>1</sup> The report to which this paper references was prepared as an account of work sponsored by the California Public Utilities Commission. It does not necessarily represent the views of the Commission or any of its employees except to the extent, if any, that it has formally been approved by the Commission at a public meeting. For information regarding any such action, communicate directly with the Commission at 505 Van Ness Avenue, San Francisco, California 94102. Neither the Commission nor the State of California, nor any officer, employee, or any of its contractors or subcontractors makes any warrant, express or implied, or assumes any legal liability whatsoever for the contents of this document

The second survey was fielded to non-participants who were defined as current medium and large commercial customers who were sole tenants of commercial buildings, had not participated in any of the utilities' benchmarking workshops, and were not registered users of the initiatives' Automated Benchmarking Services (ABSs).<sup>2</sup> A total of 48 qualified respondents from a population of 17,781 organizations with telephone contact information completed the non-participant survey. This sample size has a margin of error of  $\pm 11.9\%$  at the 90% confidence level.

**Table 1. Participant Groups, Sample Sizes and Error Margins**

<b>Participant Group</b>	<b>Sample Size</b>	<b>Error Margin (90% CI)</b>
<b>EB:</b> End-user (owner, renter, or property manager) workshop registrants who had benchmarked buildings in the past three years	43	$\pm 12.2\%$
<b>EN:</b> End-user (owner, renter, or property manager) workshop registrants who had NOT benchmarked buildings in the past three years	44	$\pm 12.0\%$
<b>VB:</b> Vendor workshop registrants who had benchmarked buildings for customers in the past three years	40	$\pm 12.5\%$

## Overview of Benchmarking

According to EPA, “benchmarking is a process that either compares the energy use of a building or group of buildings with other similar structures or looks at how energy use varies from a baseline” (ENERGY STAR 2008). AB 1103, the San Francisco ordinance addressing benchmarking, and the IOUs' benchmarking initiatives are all geared to benchmarking with ENERGY STAR Portfolio Manager. Portfolio Manager is an online interactive energy management tool that allows users to track and assess the energy and water consumption of their commercial building or portfolio of buildings, and benchmark the energy consumption to other similar buildings. Like other “operational” rating tools, Portfolio Manager uses a combination of basic information about a building and 12 months of energy consumption data to determine a building's energy use per square foot, or Energy Use Intensity (EUI), at a particular point in time and, where available, rate the building's energy efficiency against similar types of buildings in the nation. As with other operational rating tools, Portfolio Manager does not provide enough information to help identify specific improvements needed in a particular building. It can, however, help users responsible for multiple buildings pinpoint specific buildings for further investigation.

According to EPA representatives interviewed for this study, the theory behind Portfolio Manager is that building decision-makers who benchmark with this tool obtain an understanding of how the whole building consumes energy and delivers services, and how it compares to similar buildings across the nation, to other buildings owned by the same owner, or both. This information is expected to increase the chances that decision-makers will pursue energy efficiency opportunities for their building(s). To this end, Portfolio Manager establishes a foundation for the pursuit of comprehensive building energy efficiency and provides a portal to energy efficiency program offerings from their local utilities or program administrators.

<sup>2</sup> Automated Benchmarking Service refers to the software system the utility or other energy service provider implements and offers to their customers using the EPA's Automated Benchmarking System, a software system that allows utilities and other energy service providers to electronically transfer data to and from Portfolio Manager via web services. Utility ABSs reduce the time required by customers to benchmark, and facilitate customer monitoring of building energy use, by enabling customer energy use information to be electronically downloaded from the specific utility's database into Portfolio Manager.

Similarly, the theory behind the utility benchmarking initiatives is that the support they provide will help to further the realization of the market transformation potential of universal benchmarking by encouraging customers to use Portfolio Manager and the utility ABSs to obtain information about their buildings' energy use. This information will then motivate customers to monitor their energy use, improve the benchmark scores or EUIs of underperforming buildings, and practice continuous energy improvement or strategic energy management. To this end, the California IOU benchmarking initiatives provide several forms of support for benchmarking, including but not limited to holding workshops to help customers learn to benchmark buildings with Portfolio Manager, developing and providing ongoing support for each utility's ABS software, and providing technical support to customers for Portfolio Manager as well as to each utility's ABS. The primary focus of this paper is the workshops.

## **Research Findings**

### **Customer Awareness of Benchmarking**

The research sought to understand the degree to which California customers that had not participated in utility benchmarking workshops were aware of benchmarking. The non-participant survey measured awareness of benchmarking in two ways: "unaided" (customers were asked if they had heard of the practice) and "aided" (customers were read a description of benchmarking prior to being asked if they had heard of the practice). Unaided, 16% of respondents to the non-participant survey indicated that they had previously heard of benchmarking. Combining aided and unaided, a total of 24% had heard of it.

### **How Customers Use Benchmark Scores**

Respondents to the participant survey who had benchmarked buildings with Portfolio Manager were asked a series of questions designed to help understand the extent to which their subsequent use of the tool adhered to the theorized expectation that after benchmarking, customers would monitor their energy use and try to improve the benchmark score or EUI of a building, possibly in association with a utility energy efficiency program. In general, these findings suggest that around one-half of the workshop participants who benchmarked at least one building are undertaking the kind of continued monitoring and re-benchmarking that was theorized would take place.

Most of this subgroup of respondents to the participant survey indicated continued active engagement in benchmarking subsequent to their initial benchmarking with Portfolio Manager. As Table 2 shows, about one-half (52%) agreed that they routinely monitor benchmark scores or EUIs and about three-fifths (62%) disagreed that they do not re-benchmark or check their buildings' benchmark scores. Their performance of benchmarking after changes that could affect building energy use, however, was somewhat mixed. About two-thirds (64%) agreed that they or someone else in their organization usually checks the benchmark score or re-benchmarks after making a change to a building or to equipment that could affect its energy use, but fewer than half (38%) agreed that they re-benchmark or check their buildings' benchmark scores when there is a change in building tenancy.

Among the two-thirds (68%) of respondents who indicated routinely monitoring benchmark scores, most (58%) reported that their organization re-benchmarked at least once a quarter (Table 3).

The respondents who had benchmarked buildings most frequently reported that they had used the information obtained from benchmarking to establish a baseline score or EUI for future comparison (85%) and to identify energy efficiency opportunities in the building (84%). A large majority (90%) of these respondents said that benchmarking had provided them with new information about their buildings' energy performance (Table 4).

**Table 2. Continued Monitoring of Building Benchmarking Scores**

	Strongly agree (8-10)	Somewhat agree (6-7)	Neither agree nor disagree (5)	Somewhat disagree (3-4)	Strongly disagree (0-2)
<i>Sample size (EB): 41</i>					
"You or someone else in your organization routinely monitors your buildings' benchmark scores or EUIs."	50%	2%	16%	5%	18%
"You do not re-benchmark or check your buildings' benchmark scores."	30%	6%	2%	13%	49%
"When you make a change to a building or to equipment that could affect its energy use, you or someone else in your organization usually checks the benchmark score or re-benchmarks after making the change."	48%	16%	4%	11%	20%
"You re-benchmark or check your buildings' benchmark scores when there is a change in building tenancy."	37%	<1%	14%	7%	25%

**Table 3. Frequency of Re-benchmarking or Checking Scores**

<i>Sample size (EB that routinely monitor benchmark scores):27</i>			
At least 12 times a year	29%	At least every two years	<1%
At least four times a year	29%	Less than every three years	3%
At least twice a year	16%	Don't know	3%
At least yearly	19%		

**Table 4. How Organization Used Information Obtained from Benchmarking and Value Obtained from Benchmarking**

How Organization Used Information Obtained in Benchmarking		Value from Benchmarking	
<i>Sample size (EB)</i>		<i>41</i>	
Set a baseline score or EUI for future comparison	85%	Benchmarking provided new information about buildings' energy	90%
Identify energy-efficiency improvement opportunities in the building	84%	Benchmarking was a requirement for "ENERGY STAR" or "LEED" certification	66%
Identify which buildings needed the most improvement in their energy performance	67%	Benchmarking confirmed or provided proof for management of what was already known about buildings' performance	64%
Set goals for facility performance	63%		

## Importance of Benchmarking to the Marketplace

It appears that a subset of workshop registrants who benchmarked are using the results for real estate business purposes. Nearly one-half (48%) of respondents to the workshop participant survey who had benchmarked buildings with Portfolio Manager agreed (6-10), and over one-fourth (29%) *strongly* agreed (10), that their organization considered benchmarking scores in the performance assessments of building engineers or property managers. Nearly one-fifth (17%) of participant respondents that had benchmarked strongly agreed (8-10), and a similar proportion (18%) at least somewhat agreed (6-10) with the statement: “Your organization considers benchmarking scores in the bonuses of building engineers or property managers” (Table 5).

**Table 5. Organization’s Use of Benchmarking in Rewarding Staff Performance**

	Strongly agree (8-10)	Somewhat agree (6-7)	Neither agree nor disagree (5)	Somewhat disagree (3-4)	Strongly disagree (0-2)
<i>Sample size (EB): 41</i>					
Organization considers benchmarking scores in the performance assessments of building engineers or property managers	29%	19%	8%	0%	40%
Organization considers benchmarking scores in the bonuses of building engineers or property managers	17%	1%	18%	7%	56%

In addition, of respondents to the participant survey who had benchmarked buildings with Portfolio Manager,

- More than one-half (53%) indicated that they either had used or expected to use their benchmarking activities to market buildings or otherwise differentiate their business;
- About one-quarter (26%) reported that their organization used benchmarking data to help value buildings for leases;
- About one-quarter (24%) reported that their organization used benchmarking data to help market buildings to potential tenants; and
- Just over one-third (35%) reported that benchmarking had played a role in the acquisition of new buildings by their organization.
- Respondents to the participant survey who indicated that benchmarking played a role in the acquisition of new buildings by their organization were asked to specify the role it played. The most commonly offered response was that benchmarking helped to evaluate the cost of operating or upgrading the building (5 out of 12).
- Nearly one-fifth (17%) of respondents to the participant survey who had benchmarked said their benchmarking activities played a role in the sale of buildings in their portfolio.

## Benchmarking and Subsequent Energy Savings

About three-fifths (62%) of end-user respondents to the participant survey who had benchmarked said that their organization had changed how it managed building energy use since benchmarking. When this subgroup was asked to rate how much of an influence benchmarking had on how their organization managed building energy use, all said that it had at least some influence, and 62% indicated that it had a great or very great deal of influence (Table 6). When

asked how benchmarking had changed their organizations' energy use, end-user respondents to the participant survey who benchmarked most frequently reported monitoring of controls, thermostats, buildings, or electrical or steam usage (25%), followed by identifying areas or buildings for reducing energy use (22%) (Table 7).

**Table 6. Influence of Benchmarking on How Organization Manages Building Energy Use**

	A Great or Very Great Deal of Influence (8-10)	(6-7)	(5)	(3-4)	No Influence (0-2)
<i>Sample size (EB that said their organization had changed how it managed building energy use since benchmarking): 24</i>					
Degree of influence	62%	6%	21%	10%	0%

**Table 7. How Organization's Management of Energy Use Changed Since Benchmarking**

<i>Sample Size (EB whose organizations changed energy use after benchmarking): 24</i>			
More frequent monitoring (of controls, thermostats, buildings, electrical/steam usage)	25%	Benchmarking	7%
Identify areas or buildings for reducing energy use	22%	Implemented automated controls	7%
Installing energy-efficient lighting/ lighting upgrades	18%	Participate in energy efficiency programs	5%
Reduce energy use	12%	Changes in business practices/energy efficiency policy	3%
HVAC upgrades	7%	Retrofits/upgrades to maintain Energy Star requirements	3%
More awareness in managers/organization as a whole	7%	Other	9%

Eighty-four percent of respondents to the participant survey who had benchmarked indicated that they had planned or implemented improvements (including upgrades to physical plant or equipment) to benchmarked buildings since benchmarking. These 34 respondents identified two measure upgrades most frequently, lighting upgrades (96%) and HVAC improvements (83%), followed by three management or behavioral changes: adding energy management system or controls (82%), conducting energy audits or feasibility studies (81%) and changing thermostat set points and turning off lights (80%) (Table 8).

**Table 8. Improvements Planned or Implemented Since Benchmarking**

<i>Sample size (EB): 41</i>			
Organization has planned or implemented improvements since benchmarking			84%
<i>Sample size (EB that planned or implemented improvements): 34</i>			
Lighting upgrades	96%	Motors	57%
HVAC	83%	Refrigeration	53%
Energy management system or controls	82%	Windows	39%
Energy audits or feasibility studies	81%	Air compression	29%
Behavior changes, like changing thermostat set points and turning off lights	80%	Insulation/Sealing	22%

This same subgroup of respondents to the participant survey was asked how important the benchmark scores or EUIs were to the decision(s) to make subsequent energy efficiency improvements in benchmarked buildings. As Table 9 shows, eighty percent of this subgroup

gave responses indicating that the benchmark scores or EUIs were at least somewhat important (4-10) to decision-making; of these, 42% indicated that they were very important (8-10). Thus, for 67% of participants who benchmarked the benchmark scores or EUIs were at least somewhat important (4-10) to the decision to make subsequent changes to the buildings benchmarked,<sup>3</sup> and very important (8-10) to 35% of participants who benchmarked.<sup>4</sup>

**Table 9. Importance of Benchmark Scores or EUIs to Decisions to Make Energy-efficiency Improvements**

	Very important (8-10)	7	6	5	4	3	Not at all important (0-2)	Don't know
<i>Sample size (EB that planned or implemented improvements): 34</i>								
Importance of Benchmark Scores or EUIs	42%	12%	5%	12%	9%	6%	13%	1%

There appears to be a positive relationship between benchmarking and utility program participation. About four-fifths (81%) of respondents to the participant survey who had planned or made changes to buildings subsequent to benchmarking said at least some of the changes were associated with energy-efficiency programs offered by their utility (Table 10).

That more than one-half (53%) of respondents to the participant survey who benchmarked buildings agreed (6-10) and nearly two-fifths (37%) strongly agreed (8-10) with the statement “You implement more comprehensive energy efficiency measures in the buildings you benchmark” (Table 10) suggests that benchmarking may encourage more comprehensive retrofits. However, participants could simply be more likely to benchmark buildings on which they are considering doing more comprehensive retrofits.

**Table 10. Comprehensiveness of Improvements to Benchmarked Buildings**

	Strongly agree (8-10)	Somewhat agree (6-7)	Neither agree nor disagree (5)	Somewhat disagree (3-4)	Strongly disagree (0-2)	Don't know
<i>Sample size (EB): 41</i>						
“You implement more comprehensive energy efficiency measures in the buildings benchmarked”	37%	16%	30%	1%	11%	4%

Since respondents to the participant survey had taken the first step of voluntarily making the decision to participate in the workshops, they may have been pre-disposed to making energy efficiency improvements. Thus, it may not be possible to extrapolate the results for actions taken subsequent to benchmarking and any related savings to customers who benchmark but do not volunteer to attend a utility energy efficiency workshop.

Because of the low rate (5%) at which respondents to the non-participant survey reported benchmarking buildings, the sample size for the non-participant group was too small to assess

<sup>3</sup> Calculated by multiplying the 84% of participants that made changes to buildings subsequent to benchmarking by the 80% who gave responses indicating that the benchmark scores or EUIs were at least somewhat important (4-10).

<sup>4</sup> Calculated by multiplying the 84% of participants that made changes to buildings subsequent to benchmarking by the 42% who gave responses indicating that the benchmark scores or EUIs were very important (8-10).



whether the relationships between benchmarking and subsequent energy saving actions hold for customers who benchmarked without taking a utility workshop.

## **Examination of Benchmark Scores and EUIs**

To help in understanding the applicability of Portfolio Manager to California buildings, the evaluation team analyzed Portfolio Manager benchmark scores and EUIs stripped of customer-identifying data from more than 4,000 buildings obtained through one IOU's ABS. The data set was found to include a much higher percentage of very low (0) and very high (80-100) scores than would normally be expected. The team concluded that a substantial percentage of the benchmark scores and EUIs in this data set were inaccurate, either because they were incomplete or because of user error.

Benchmarking a building for the first time can be a long process, and it can take weeks or months for a customer to gather and enter all the building and meter information needed to provide an accurate score or EUI reflecting all the building's attributes and energy use. However, Portfolio Manager generates a benchmark score and/or EUI as soon as a minimum amount of data is entered—whether or not complete building and meter data have been entered. Since there is currently no way via either Portfolio Manager or the California IOUs' ABSs to identify those scores or EUIs that are based on complete versus partial information, the team could not complete the planned analysis.

It may be technically feasible to render the benchmark score and EUI data suitable for analysis and for tracking progress toward states' benchmarking goals. One possible solution would be to modify Portfolio Manager, or utility ABSs, so that scores and EUIs based on complete building and meter data are flagged.

## **Discussion and Conclusions**

This research suggests that awareness of benchmarking among utility customers that have not participated in a utility benchmarking workshops is relatively low. The non-participant survey found that among a sample of non-participant commercial customers that were likely to qualify for and readily be able to benchmark a building with Portfolio Manager, just 16% had previously heard of benchmarking (when asked unaided). California IOUs have been instrumental in the development of automated benchmarking services with Portfolio Manager and the state has been on the cutting edge of commercial building benchmarking for some years. Given this, the authors expect that awareness of benchmarking among commercial customers of utilities in other states is likely to be similarly low, if not lower.

The theory behind Portfolio Manager and the IOU initiatives suggests that we should expect customers who benchmark to begin to monitor their benchmark scores on a regular basis as an outcome of using Portfolio Manager. Taken together, the findings about frequency of monitoring and re-benchmarking suggest that about one-half of the workshop participants who benchmarked are undertaking the kind of monitoring and re-benchmarking the theory leads us to expect. For example, nearly one-half of end-user respondents to the participant survey who benchmarked (48%) strongly agree that someone in their organization routinely monitors benchmark scores or EUIs. Among the end-user respondents to the participant survey whose organizations re-benchmark routinely, nearly three-fifths (58%) report doing so at least four times a year. The majority of end-user respondents to the participant survey (64%) agree that

someone in their organization usually checks the benchmark score or re-benchmarks after making a building or equipment change. This finding raises the issue of how to motivate workshop participants who did not report carrying out the desired monitoring and re-benchmarking after using Portfolio Manager to do so. In some cases, it may be that the reason the desired management behavior has not materialized is that not enough time has passed for the organization to make building management changes since benchmarking, or for the respondent to develop a sense of the frequency of score monitoring and re-benchmarking. Finding effective ways to motivate organizations that have benchmarked but do not take the next step represents a program opportunity that would help in realizing the promise of benchmarking.

The research showed one of the primary customer uses of benchmarking with Portfolio Manager has been to help customers identify energy efficiency opportunities in their buildings. More than four-fifths of end-user respondents to the participant survey who benchmarked (84%) reported using the information obtained from benchmarking for this purpose. Yet Portfolio Manager is not designed to identify specific energy-saving opportunities within buildings. Identifying these opportunities typically requires an energy audit. This finding suggests that energy efficiency program administrators in California and other states would do well to target customers who have recently benchmarked with Portfolio Manager for participation in utility programs so as to help them identify energy efficiency opportunities in the benchmarked buildings. It also suggests that there is a need for a tool that identifies energy efficiency opportunities within a building. Supplemental use of another benchmarking tool with Portfolio Manager may help meet this need. For example, program administrators could encourage customers to use Portfolio Manager in conjunction with a tool designed to identify specific energy efficiency opportunities. This could be an asset-rating tool which requires a site visit by a certified rater. The BEARS benchmarking tool being developed by the California Energy Commission is a California-specific example of such a tool (CEC 2009). California customers should also soon have access to a new module being developed by Lawrence Berkeley National Laboratory for EnergyIQ, a California-specific operational rating tool for benchmarking which, like Portfolio Manager, does not require a site visit. The EnergyIQ module will be calibrated for each building type in the California Commercial End-Use Survey (CEUS) and will model the effect of each action and estimate a potential savings range associated with it. Users will then be able to generate a list of potential actions for a particular building and the possible savings associated with the action (LBNL 2011). Another way to address the desire of Portfolio Manager users to identify energy-saving opportunities within their buildings might be for EPA to include more diagnostic functionality in Portfolio Manager, either by adding this as content or allowing customization of the displayed information for utility customers.

Several of the stakeholders, customers, and utility staff interviewed for this study pointed out the value of Portfolio Manager's association with ENERGY STAR, and offered anecdotal evidence of spillover from the AB 1103 requirement to benchmark with this nationally recognized tool. Any state or utility that considers the possibility of supporting or encouraging customers to use Portfolio Manager in conjunction with another benchmarking tool needs to be mindful of the value of the ENERGY STAR label in the eyes of customers and in the commercial building marketplace, and should be careful about how the use of supplemental tools is framed, lest this value be eroded.

The results from questions to assess the importance of benchmarking to the marketplace indicated that benchmarking currently plays a role in commercial real estate business among California customers who benchmarked, despite the fact that AB 1103 had not yet taken effect at

the time of the survey. In addition, nearly one-half (48%) of workshop registrants who benchmarked use benchmarking to some extent in staff performance assessments. The use of benchmarking for real estate business purposes and staff performance assessments bodes well for the future of benchmarking in California and across the nation.

The survey showed that for a subset of customers who registered for utility benchmarking workshops and benchmarked with Portfolio Manager, the information obtained resulted in some energy savings. Among this group:

- Benchmarking resulted in subsequent building energy management actions.
- Benchmarking resulted in energy efficiency improvements in buildings.
- Benchmarking was associated with utility program participation.
- There were tangible energy savings from benchmarking; a substantial portion of the savings was associated with utility programs; and it should be possible to measure these savings.

Since the respondents to the participant survey had taken the first step of voluntarily making the decision to participate in the workshops, it is possible that they were already predisposed to making energy efficiency improvements. Thus, it may not be possible to extrapolate these results to California customers who benchmarked but did not volunteer to attend a utility energy efficiency workshop. It may be worthwhile, however, to explore the extent to which benchmarking resulted in subsequent program participation, which then yielded energy savings.

A substantial percentage of the benchmark scores and EUIs obtained for this study appeared to be inaccurate, either because they were incomplete or because of user error, and thus were not suitable for analysis or for tracking progress on commercial building energy efficiency. One possible approach to rendering the benchmark score and EUI data suitable for analysis and for tracking progress toward states' benchmarking goals would be a modification to Portfolio Manager, or to utility ABSs, to enable users to indicate when all the meters known to be associated with the building, and all the facility's attributes, have been successfully entered. If technically feasible, this would enable utilities that provide ABS services to their customers to use the data to gain a better understanding of commercial building energy use and energy management in their service territories.

Many of the variables discussed here, such as awareness of benchmarking, rate of benchmarking, and frequency of monitoring and re-benchmarking, could serve as indicators of market progress on benchmarking in California and other states going forward. States or utilities that wish to survey non-participants about benchmarking for such purposes will need to pay especially careful attention to recruitment, however, as the evaluation team found that non-participants are a much more difficult group to recruit for a survey on benchmarking than workshop participants.

In summary, the findings provide evidence to support the theory behind Portfolio Manager that the understanding of building energy provided by the tool increases the chances that decision-makers will pursue energy efficiency opportunities for their building(s). A complete list of findings and recommendations that may be of use to program administrators interested in encouraging benchmarking with Portfolio Manager can be found in the related study, “Statewide Benchmarking Process Evaluation,” (NMR Group Inc. & Optimal Energy, Inc. 2012) on the CALMAC website, [www.calmac.org](http://www.calmac.org).

## References

- [AB 1103] California Assembly Bill 1103. 2011. Government Code 65584.11 (adopted September 1, 2011). <http://legiscan.com/gaits/text/350726>.
- [CEC] California Energy Commission. 2009. “AB 758 Comprehensive Program, Phase 1: Infrastructure Development & Implementation Plan (2010-2012).” [http://www.energy.ca.gov/ab758/Proposed\\_Program\\_Delivery-phase1.html](http://www.energy.ca.gov/ab758/Proposed_Program_Delivery-phase1.html). Sacramento, Calif.: California Energy Commission.
- [CPUC] Decision 09-09-047, California Public Utilities Commission (adopted September 24, 2009). <http://docs.cpuc.ca.gov/Published/Graphics/107829.pdf>.
- ENERGY STAR. 2008. *ENERGY STAR Building Manual*. April. <http://www.energystar.gov/index.cfm?c=business.EPA BUM CH2 Benchmarking>. Washington, D.C.: U.S. Environmental Protection Agency and U.S. Department of Energy.
- Guevarra, L. 2011. “SF Requires Energy Audits, Benchmarking for Commercial Buildings.” <http://www.greenbiz.com/news/2011/02/10/sf-requires-energy-audits-benchmarking-commercial-buildings>. *Greenbiz.com*. February 10.
- [LNBL] Lawrence Berkeley National Laboratory. 2011. “CalArch 2.1.” <http://poet.lbl.gov/cal-arch/> and <http://energyiq.lbl.gov/>. Berkeley, Calif.: Lawrence Berkeley National Laboratory.
- NMR Group Inc. & Optimal Energy, Inc. 2012. “Statewide Benchmarking Process Evaluation.” April. CPU0055.01. [http://www.calmac.org/publications/Statewide\\_Benchmarking\\_Process\\_Evaluation\\_Report\\_CPU0055.pdf](http://www.calmac.org/publications/Statewide_Benchmarking_Process_Evaluation_Report_CPU0055.pdf).
- Vaidya, R., Reynolds, A., Azulay, G., Barclay, D. & B. Tolkin. 2009. “ENERGY STAR® Portfolio Manager and Utility Benchmarking Programs: Effectiveness as a Conduit to Utility Energy Efficiency Programs.” In *Proceedings of the 2009 International Energy Program Evaluation Conference*, 738-750. <http://www.iepec.org/2009PapersTOC/papers/084.pdf#page=1>.