



2016 Hotel Industry Survey: Energy and Water Management Best Practices



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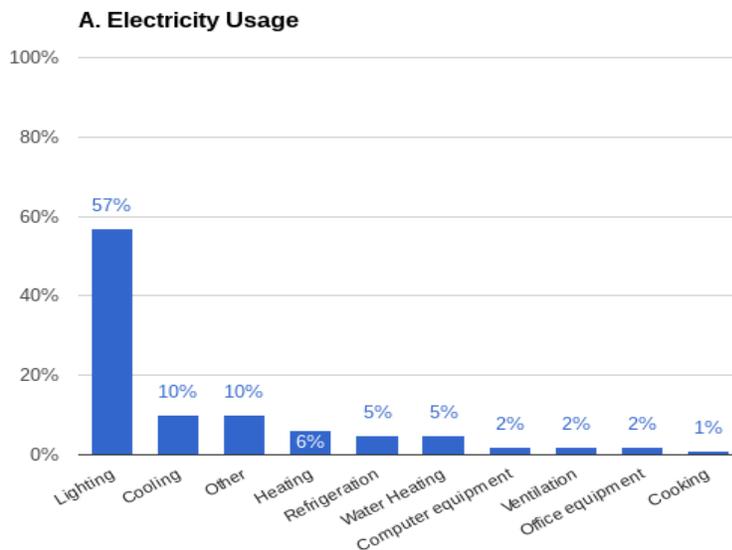
Energy Background, Statistics

According to the 2012 Commercial Building Energy Consumption Survey, hotels and motels in the United States use an average of 15.3 kilowatt-hours (kWh) of electricity and 43.8 cubic feet of natural gas per square foot (ft²) annually.¹ The CBECS also ranks the lodging sector's Energy Use Intensity (EUI) as one of the highest at 96.9 thousand Btu per square foot. This surpasses the EUI of office buildings, which comes in at 77.8 thousand Btu per square foot.

Hotel and motel energy use will vary depending on the types of amenities available; lighting and space cooling represent the lion's share of the electricity these facilities consume. (Figure 1) In most scenarios, natural gas is the primary energy source used for space heating which represents their largest use of natural gas.

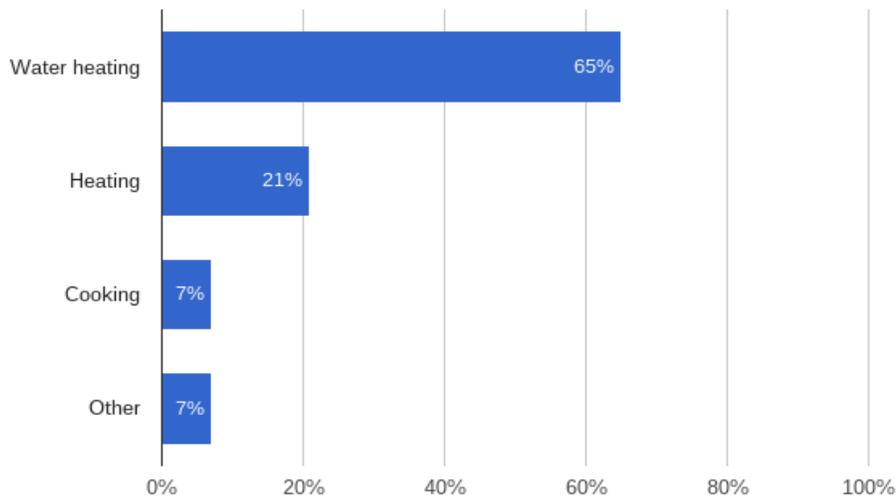
Figure 1: Energy consumption by end use

In hotels and motels, lighting is the primary consumer of electricity (A), and water heating is mostly serviced by natural gas (B).



1 Commercial Buildings Energy Consumption Survey (2012): <http://www.eia.gov/consumption/commercial/reports/2012/energyusage/index.cfm>

B. Natural gas usage



Water Background, Statistics

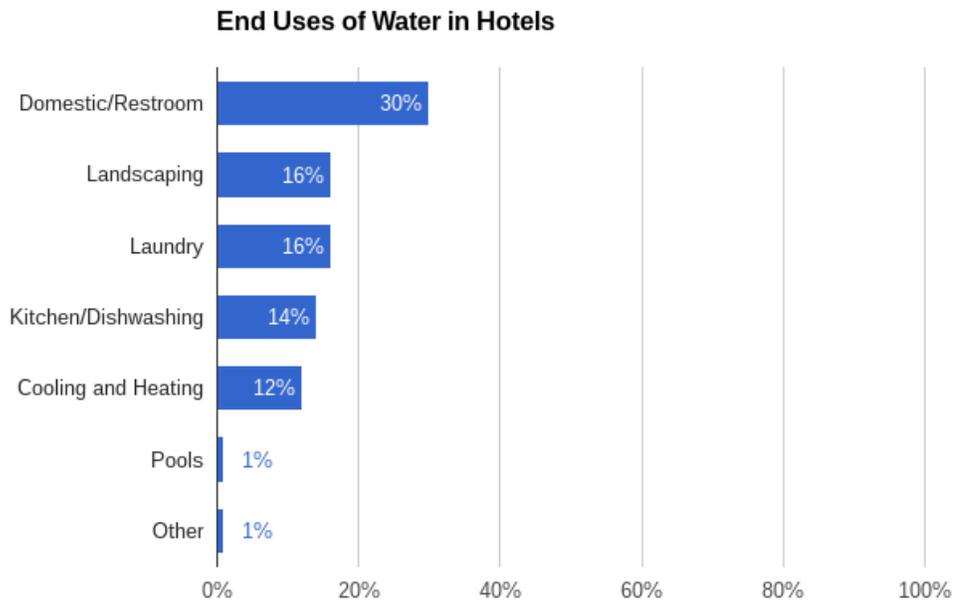
On average, hotels and motels in the U.S. use 21,537 gallons² of water per day. The largest uses of water in hotels are restrooms, laundry operations, landscaping, and kitchens. Over the past 10 years, the costs of water and wastewater services have outpaced that of the consumer price index. Rising utility costs are also a factor to consider, as an offset to replacing aging water supply systems.

Water used in hotels and other lodging businesses accounts for approximately 15 percent of the total water use in the nation's commercial and institutional facilities. Leaks and waste due to faulty systems are a considerable drain on resources. For example, a leaky toilet might result in an additional usage of 50 gallons of water per day, and a dripping showerhead could potentially waste up to 1,000 gallons per week.

2 "Hotel & motel checklist", Southwest Florida Water Management District, <https://www.swfwmd.state.fl.us/conservation/waterwork/checklist-hotel.html>

Energy and water consumption are related – laundry and cooling by using HVAC units accounts for an average of approximately 26% of the water use in any hotel/motel.

Figure 2: End Uses of Water in Hotel



Created by analyzing data from: New Mexico Office of the State Engineer, American Water Works Association (AWWA), AWWA Research Foundation, and East Bay Municipal Utility District.

Given the high volume of energy and water consumption in this sector and their associated costs, there has been an increase in public awareness of energy and water efficiency, as well as the savings associated with reduced consumption. Guests influence directly by preferring hotels with sustainability standards and a reputation for green corporate responsibility. They also influence indirectly, as some hotel energy management goals are engineered around servicing the hotel guests, such as monitoring water and improving operations for occupancy comfort. Revenue is not decoupled from sustainability: Environmental sustainability is a leading factor in purchasing decisions, and many municipalities and government agencies

have requirements for meeting spaces that address water and energy efficiency. Adopting efficient practices will allow hotel operators to meet these demands and position them for recognition from programs that identify eco-friendly and green hotels.

Why this survey?

Industry surveys in sustainability and energy efficiency to date have either focused on specific regions, or on guests and travelers. For example, TripAdvisor conducted a survey of U.S. travelers that revealed 62% of potential hotel guests of “often or always” seek to stay at hotels that are eco-friendly, indicating that a reputation for sustainability is an important selling point for a contemporary hotel.³ Hotel Energy Solutions’ 2011 survey did not explore consumer attitudes but instead focused on the European market’s various methods employed to improve energy performance. The findings demonstrated that energy efficiency technologies, while not widely used, were more likely to be found in owned and managed hotel chains rather than franchised chains.⁴

In the meantime, Navigant Research conducted a study of the hotel market and predicted that energy management software (EMS) revenue in the lodging industry would experience a compound annual growth rate (CAGR) of 16.2% between 2012 and 2020.⁵ Cornell Hospitality published a report that delved into the outcomes for LEED Certified hotels, which discovered that LEED certification was correlated with superior financial performance.⁶ The specificity and scope of previous surveys are useful to benchmark regional energy usage but do not focus on the operational depth and diversity of methods and tactics employed by the hotel teams in running their hotels efficiently. Therefore, this survey, one of the largest conducted so far on a national level in energy and water management, was created in the spirit of providing more information and transparency in the industry.

3 Survey: Two-Thirds of Travelers Want Green Hotels (2013): <http://www.forbes.com/sites/andrewbender/2013/04/22/survey-two-thirds-of-travelers-want-green-hotels-heres-how-to-book-them/#98de55b1a424>

4 Analysis on Energy Use by European Hotels: Online Survey and Desk Research (2011): http://cf.cdn.unwto.org/sites/all/files/pdf/research_series_analysisonenergyusebyeuropeanhotelsonlinesurveyanddeskresearch.pdf

5 Energy Management in the Hospitality Industry (2014): <https://www.navigantresearch.com/wp-assets/brochures/EMHI-14-Executive-Summary.pdf>

6 Environmental Sustainability in the Hospitality Industry (2015): <http://scholarship.sha.cornell.edu/cgi/viewcontent.cgi?article=1199&context=chrpubs>

MACH Energy's research survey addresses individual goals, trends and challenges in hotel energy and water management – Is there a clear movement towards sustainability, or is reducing costs the highest priority?

1) Which factors are most important to the individuals and survey respondents in the running of their hotels? Some examples of these factors include guest comfort, benchmarking requirements, ENERGY STAR score, etc.

2) How important would EMS be, or if installed already, which particular features and tactics were the most useful?

3) What are the differences between a Director of Engineering on the regional level, and a General Manager of a specific hotel?

We employed the following methodology to gather objective and accurate data to deliver a better understanding of the state of the industry: We surveyed close to 300 hotel operators and management professionals encompassing all major metropolitan areas and individuals in all states. The survey targeted hotels that offered varying amenities:

- 1) Upscale/Luxury
- 2) Full Service
- 3) Casino
- 4) Historic/Boutique
- 5) Select Service
- 6) Economy/Extended Stay
- 7) Budget

These individuals were polled through an online survey with questions specifically tailored to their stated job title, as well as their current state of efficiency implementation.

Our deepest thanks go out to all our survey respondents for taking the time to complete the questions. Their responses have offered us the opportunity to obtain in-depth insights into the state of energy and water management in hotels. If you have any comments and questions about this research and its methodology, please feel free to give us a call or send us an email.

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Survey Conclusions

1. *Cost and expense reduction*

We can summarize from the responses that cost reduction is overall the most important goal in implementing energy and water management programs, followed by sustainability. Of the respondents, 80% listed cost as the most important reason for implementing their energy efficiency and sustainability measures. This was followed by interests or requirements of guests, which 39% listed, and ENERGY STAR scores or LEED requirements, which 30% listed. When broken down by job title, the results hold true. C-level executives, hotel owners, asset managers, general managers, regional directors, operations managers, engineering managers and sustainability directors universally stressed the importance of cost savings, whether they were considering motivations for adopting a sustainability program, determining the benefits of an energy management system or describing energy priorities.

Our findings in cost and expense recovery have also been validated by other reports such as the San Francisco Climate Action Strategy 2014 developed by the Urban Land Institute (ULI), which saw that “dollars and cents” were still the driving factor behind efficiency and energy management in buildings.⁷

2. *Traditional Methods, High Capital*

Sustainability ranked high as a priority for many respondents in running their hotels, and in order to achieve these goals, many of these individuals chose “Making Operational Improvements” alongside typically high capital cost improvements such as installing occupancy sensors and associated management systems. As a breakdown, 70% of respondents preferred to utilize traditional methods, a set-up of hotel teams making operational improvements such as closing drapes in rooms to reduce the need for heating or chilling. 47% of respondents chose efficiency improvements in technology that involved high capital costs.

7 San Francisco Department of the Environment (2015): <http://www.sfenvironment.org/news/press-release/san-franciscos-benchmarking-ordinance-requiring-commercial-buildings-to-disclose-energy-data-shows-major-reduction-in-energy-use>

3. Areas of Improvement: Better Common Areas Management and Metrics-Driven Sustainability Programs

Most survey respondents were aware of the square footage of their common areas such as conference halls, swimming pools and hotel grounds. 92% knew the general sizes of their common areas, but 32% of respondents did not know how much of their hotels' energy costs was tied to the common areas where energy consumption costs can be substantial.⁸ This discrepancy reflects a lack of data-driven energy and water management in the common areas, another easily addressable challenge.

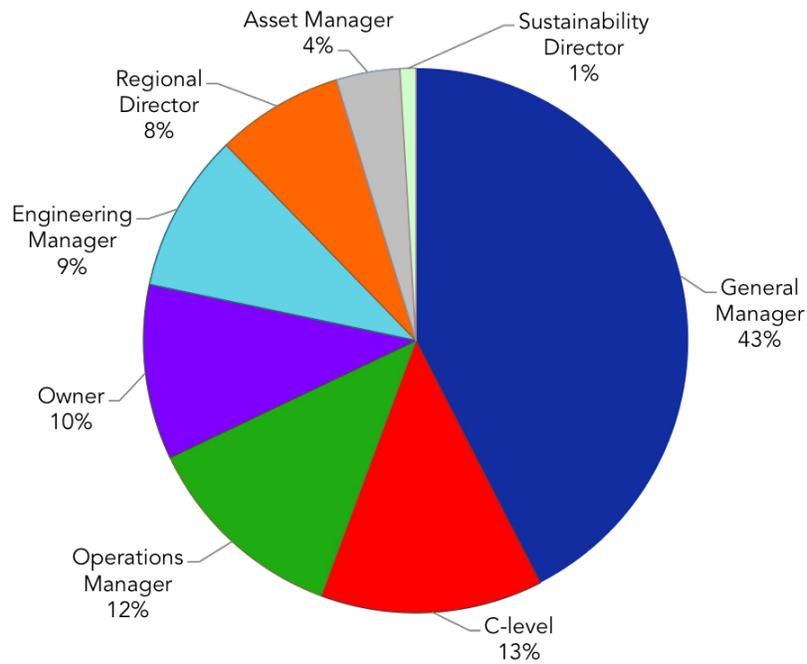
More than 63% of our respondents affirmed their hotels were running a sustainability program, indicating a widespread awareness; guest opinions and satisfactions often influenced hotels' decisions in creating such programs. However, as many as 24% of these respondents did not know how much their sustainability programs were saving in terms of cost. 35% of those with sustainability program also indicated lower savings of less than 5% or none at all.

When instituting energy and water efficiency measures, hotels need to reduce their utility expenses without sacrificing guest comfort. Together with operational improvements and high capital improvements, simple and cost-effective measures such as energy and water management software could be taken for immediate savings, building on existing systems or as a standalone.

⁸ Energy End-Use Patterns in Full Service Hotels: A Case Study <http://aceee.org/files/proceedings/2010/data/papers/1984.pdf>

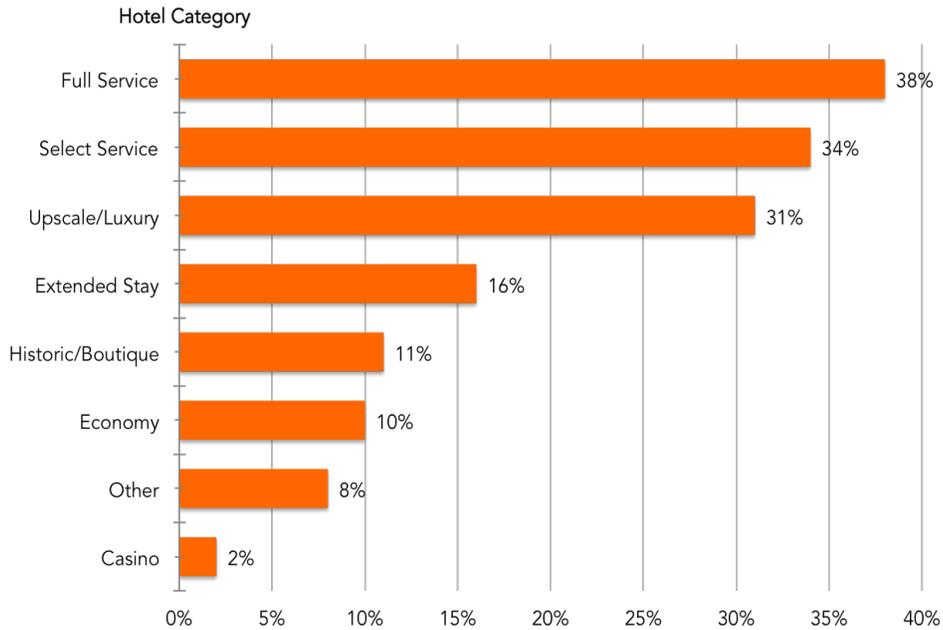
Question Analysis

Respondent Profiles: Reaching Out to The Decision Makers

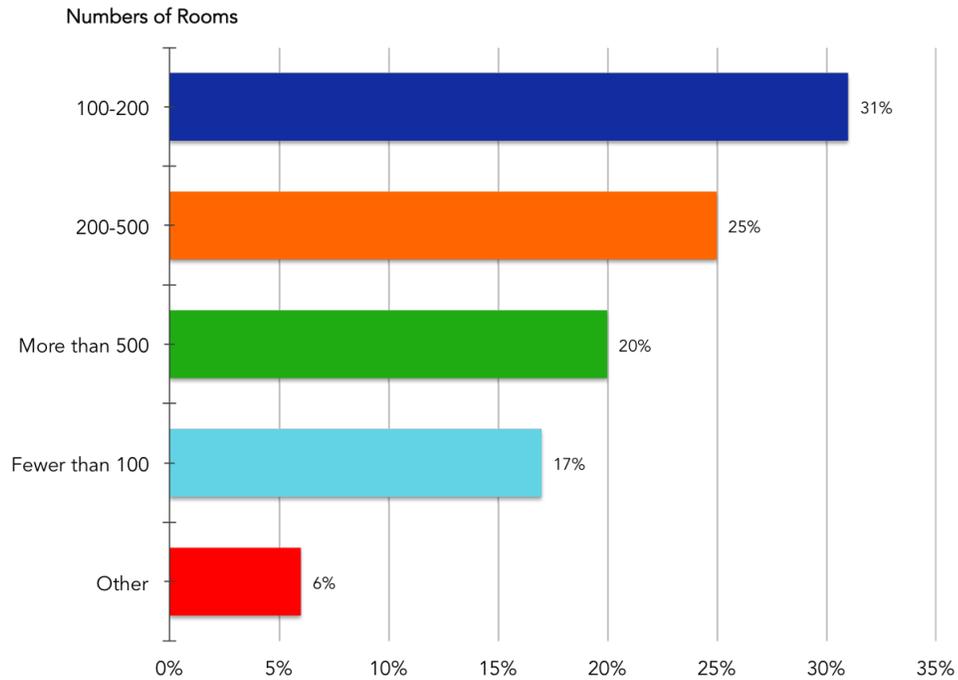


Survey respondents comprised general managers, operations managers, C-level executives and owners, engineering managers, regional directors, asset managers and sustainability directors. General managers represented almost half of respondents, while operations managers and C-level executives were the next largest group at 14%.

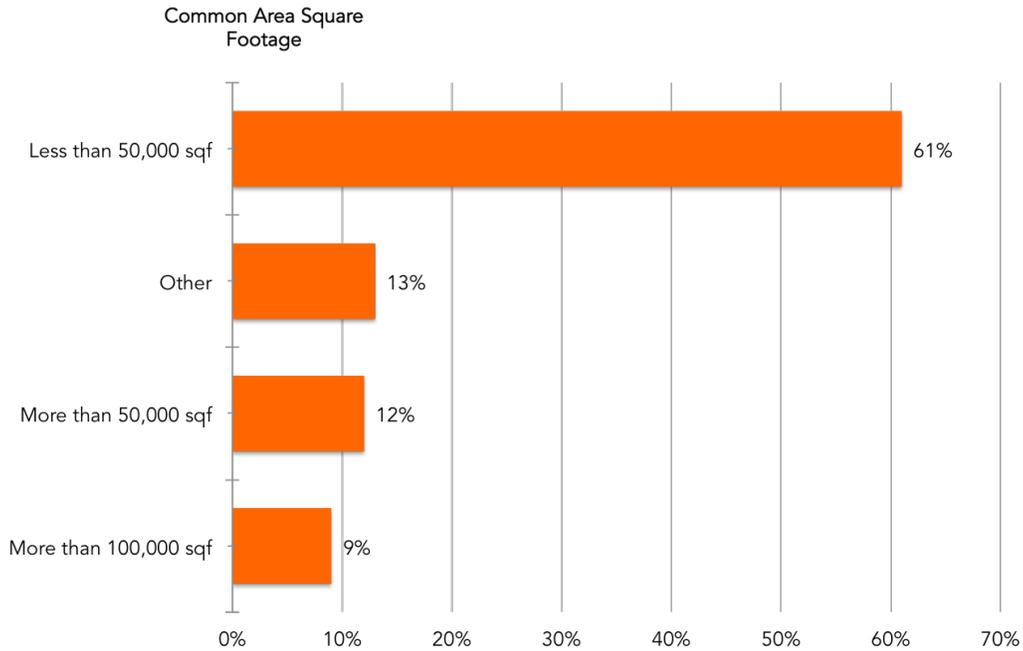
Hotel Profiles



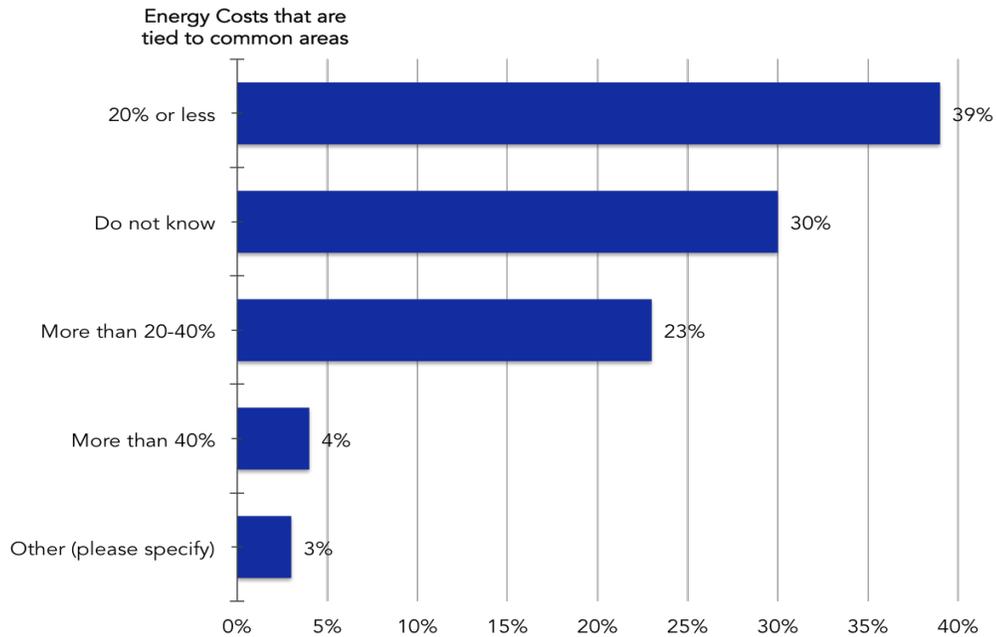
Our survey aimed to draw responses from a diverse cross-section of hotel operators. Some respondents manage more than one type of hotel. The majority of respondents represented upscale or luxury, full service, and select service hotels. Two percent of respondents represented casino hotels and resorts, 11% represented historic or boutique hotels, 10% represented economy hotels, and 16% represented extended stay hotels. The eight percent of respondents who selected "other" reported their hotels were mid-scale hotels, bed and breakfasts, condominiums or timeshares.



The number of rooms in the hotel gives a sense of the hotel's size in terms of occupancy capacity, though does not account for overall square footage that includes common areas. 31% of the hotels had between 100 and 200 rooms, and 25% had between 200 and 500 rooms. 20% of the hotels represented had over 500 rooms, and only 16% had less than 100 rooms. A small portion of respondents indicated that their hotels had as few as 50, 11 or six rooms, or that they represented multiple hotels of various sizes; these answers comprised the "other" selection.

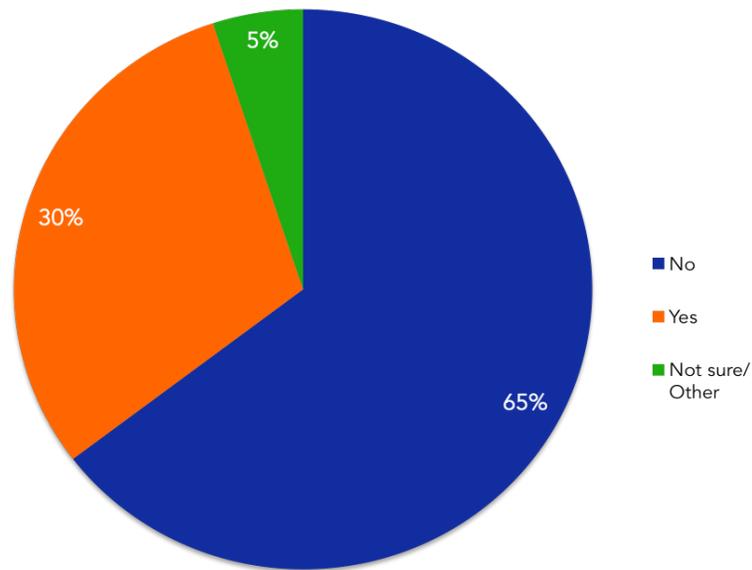


This next question addresses another aspect of hotel size - the square footage of common areas such as banquet halls and conference rooms. Many of the “other” responses reported common area sizes that fit into the listed categories. After calculating those results in, those representing hotels with fewer than 50,000 square feet were still by far the most common at 62%. Altogether, 21% of the hotels had more than 50,000 square feet, with less than half of those hotels having over 100,000 square feet of common area. Five percent of respondents were unsure of the common area space, and 13% explained after selecting “other” that they represented multiple hotels of varying common area sizes.



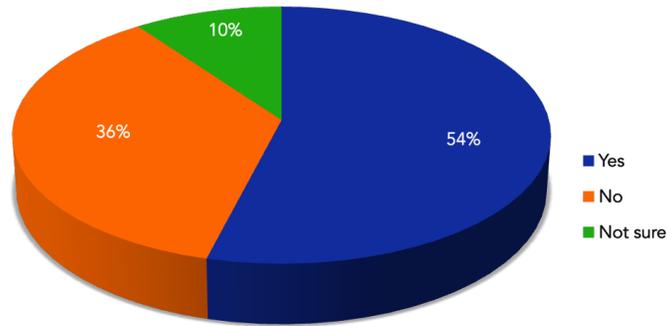
The survey respondents most commonly reported that 20% or less of their overall energy costs was tied to common areas. This is unsurprising, since 70% of these respondents represented hotels with less than 50,000 square feet of common area spaces. 23% reported that energy costs of common areas were between 20% and 40% of overall energy expenses, and only three percent reported that the energy costs for their common areas accounted for 40% or more of their overall energy expenses. Interestingly, 30% respondents did not know the relationship between their common area energy use and their energy costs. As the next question reveals, some of that uncertainty may be a result of very few surveyed hotels using energy management systems that would collect data on the energy use of each section of a hotel.

Adoption of Energy (and Water) Management Software (EMS)
*Not Building Management Systems (BMS)



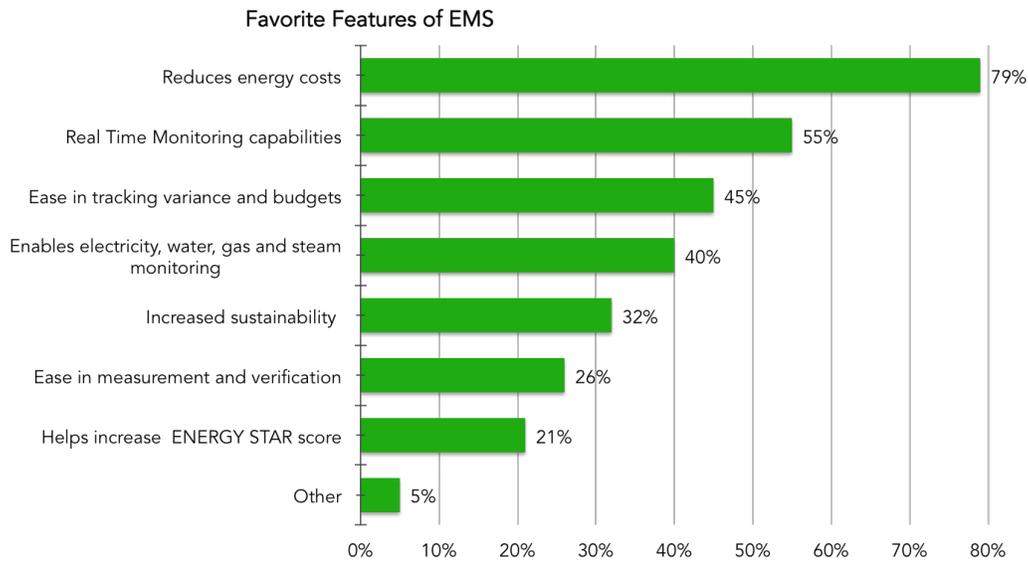
30% of respondents reported that their hotels used EMS, and 65% reported that their hotels had no EMS. Five percent were unsure if their hotels had EMS, and some respondents selecting that answer indicated that they managed some hotels with EMS and some without it. Uncertainty aside, when it comes to EMS, there is evident confusion. Among the respondents whose hotels reportedly had EMS, 68% were actually confusing EMS with a building automation system or some other product.

Awareness of Energy (and water) Management Systems (EMS)



Slightly more hotel professionals were aware of EMS than those who were not. When we zoomed in on the respondents who were unsure or had not heard of EMS, we found there existed about 45% who were uninformed about EMS and its benefits. As some respondents had already confused EMS with building automation systems, there seems to be a great opportunity to introduce a better understanding of EMS to the lodging industry.

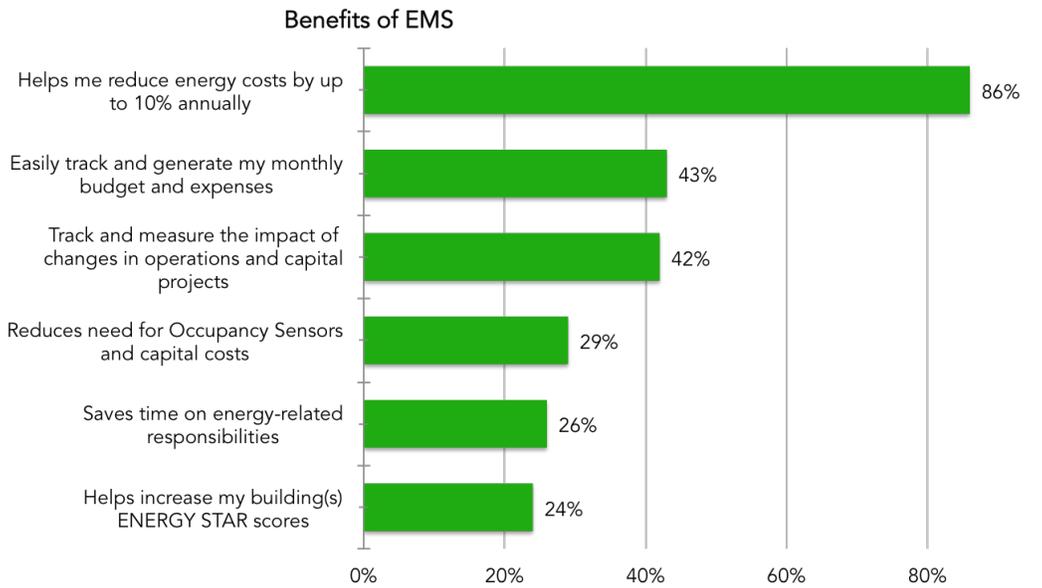
Favorite Features and Most Important Benefits of EMS



For the surveyed hotel professionals, cost savings were the strongest priority; 79% found reducing energy costs to be the most preferable benefit of EMS. Following closely behind were the features related to information access. 55% of respondents chose EMS' real-time monitoring capabilities and 45% chose its ease in tracking variance and budgets as the aspects they most preferred. Many respondents liked EMS' reach into all aspects of a building's energy performance; enabling of electricity, water, gas and steam monitoring (40%), increased sustainability (32%), and ease in measurement and verification (M&V) on capital projects (26%) were the next most popular features. ENERGY STAR score was less of a preference; only 21% appreciated that EMS could increase their scores. However, when breaking down the responses by job title, the preferences of Engineering Managers actually leaned towards the advantages of EMS related to sustainability certifications such as ENERGY STAR and LEED certification.⁹

⁹ Engineer managers most common complaint about what they like least about their EMS at 39% was that it did not help sustainability initiatives, and that it did little to increase ENERGY STAR score was next at 31%.

Alternatively, details of a building’s energy performance such as real-time monitoring or the measurement and verification of capital products, were less important to General Managers and Regional Directors, who were more concerned about overall hotel operation outcomes and the bottom line, mainly reducing costs, tracking budgets and meeting sustainability goals.¹⁰

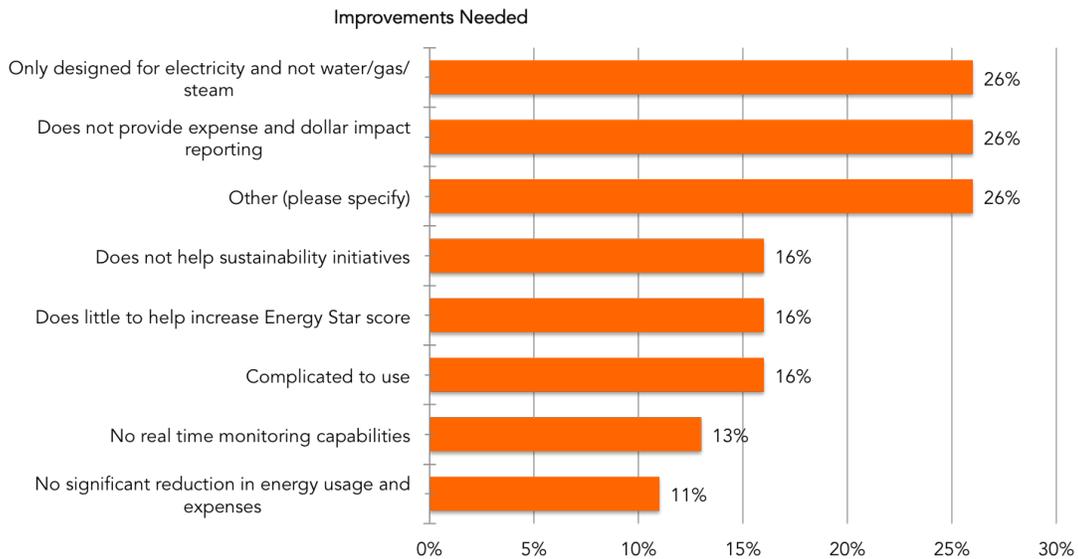


Parallel to the pattern of cost savings taking precedence, almost every hotel professional in the survey stressed that reducing energy costs would be the most significant benefit of EMS. The next two features that were important for a greater number of respondents were the ability to track monthly budget and expenses, and the ability to measure operational changes and capital projects. Earlier, respondents conveyed that operational improvements were their primary method of energy reduction, while indicating there was little measurement and verification (M&V) occurring in their current operations. EMS and its data analytics could fulfill a much-needed role of capturing the dollar impact of hotels’ current energy efficiency strategies.

¹⁰ General managers liked most about their current EMS that it reduced energy costs (78%) and that it increased sustainability (44%). Regional directors liked most that it reduced energy costs (100%), that it provided ease in tracking variance and budgets (100%) and that it increased sustainability (67%).

Additionally, 29% of respondents also valued that EMS would reduce the need for occupancy sensors and capital costs, 26% preferred that it would save time, and 24% liked that it would increase ENERGY STAR score.

Improvements Needed on Their EMS:

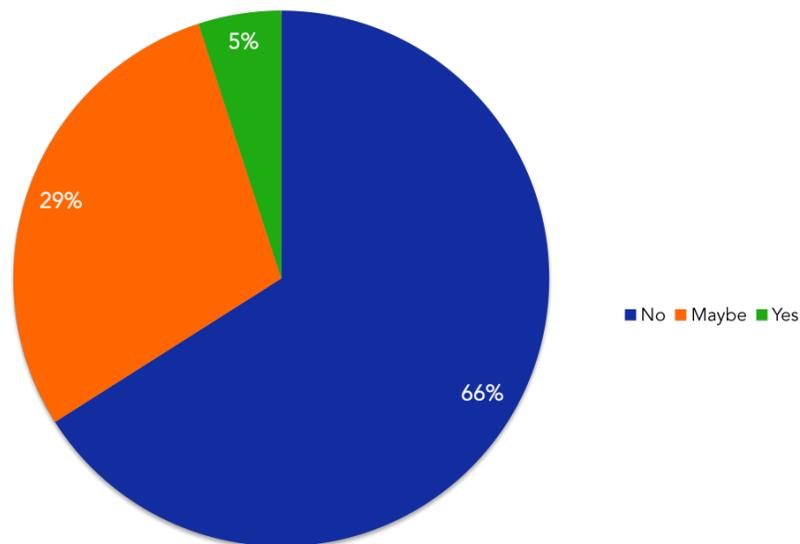


When respondents were asked to list faults of their current EMS, the answers were distributed relatively evenly. 26% of respondents were most commonly concerned about two issues with their EMS: 1) the software is only designed for electricity and not water, and 2) their EMS does not provide expense and dollar impact reporting. Considering a significant percentage emphasized the importance of water/gas/steam capabilities as well as variance reporting and budget tracking, it stands to reason that across the board, monitoring the use and expense of electricity, water, gas and steam is a priority for hotel industry professionals. For the 26% of respondents who offered reasons for dissatisfaction not listed in the survey, the concerns were with complicated and problematic installation, and having to manually input data into the system.

When we asked what feature our respondents would like to see in a future

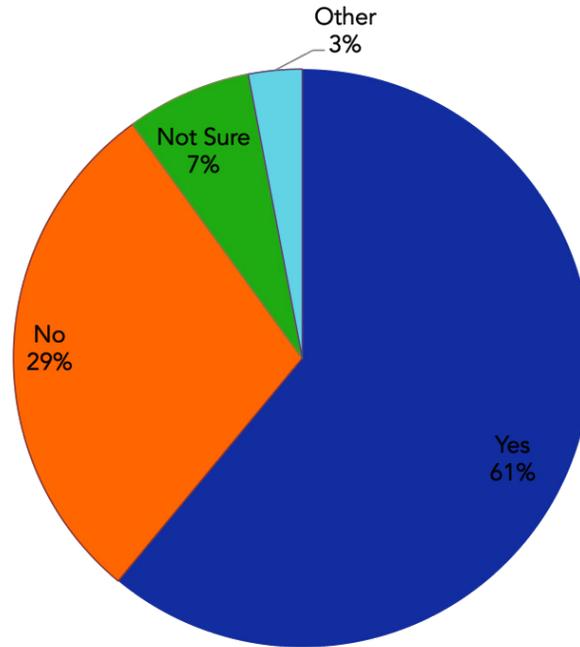
version of their software, most respondents stated they desired a more user-friendly system or a less expensive system. Extrapolating from both of these questions, it appears the hotel industry needs a user-friendly EMS that monitors electricity, gas, water and steam. Having dollar-impact figures in generated reports would also be useful.

Interest in Switching to More Satisfying EMS:

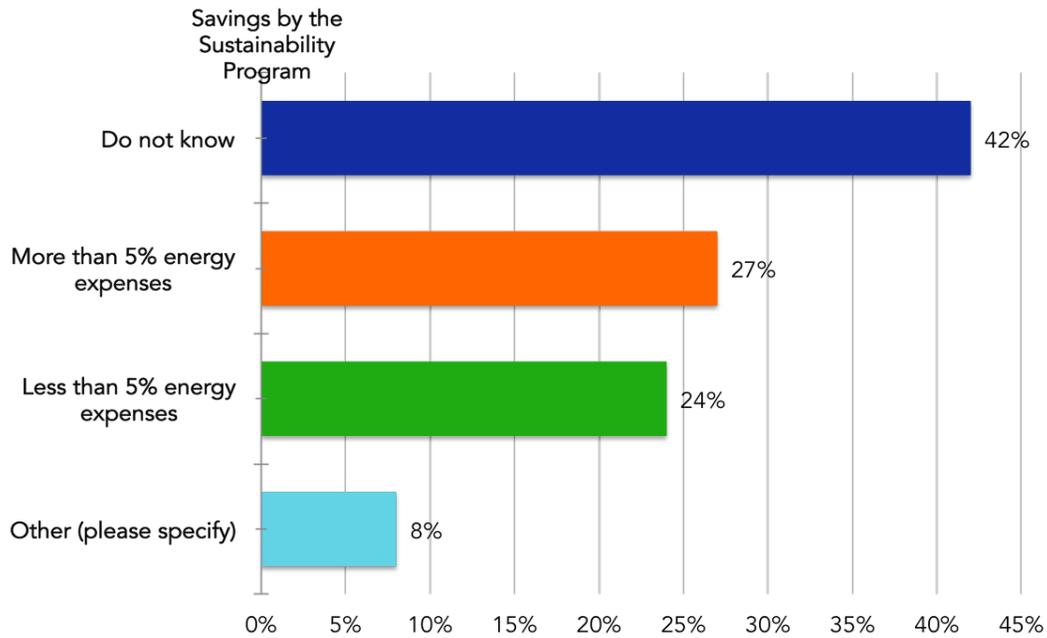


Despite indicating they found many aspects of their EMS unsatisfactory, 66% of respondents were not interested in switching to a different EMS. However, about 34% indicated they might be or were definitely interested in switching. Furthermore, some respondents that reported their hotels had EMS had actually a BAS or smart lighting installed, so that confusion affects these answers.

Hotel Sustainability Programs and Their Effect on Savings:

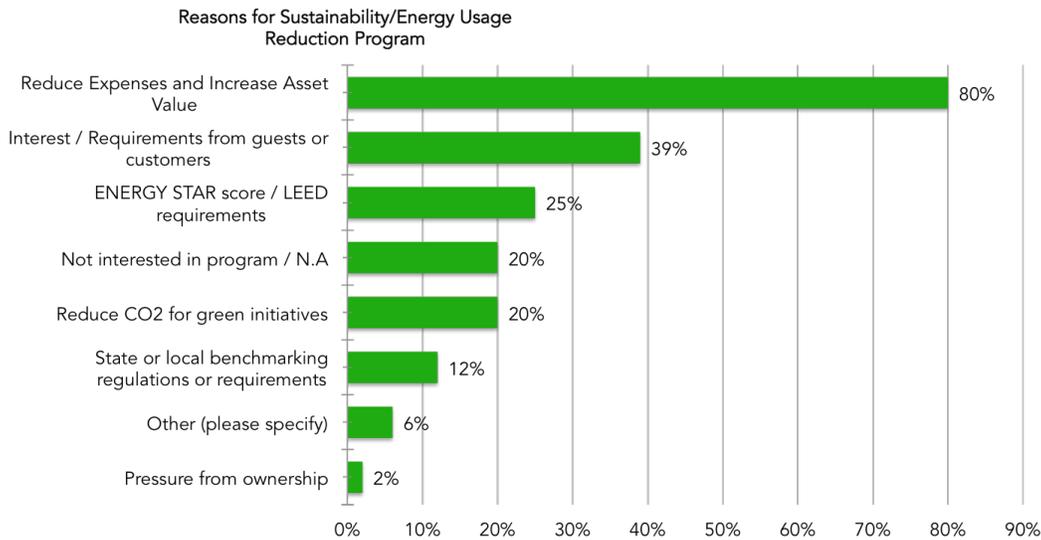


Based on our survey respondents, a majority of hotels prioritize sustainability, as 61% reported their hotels ran a sustainability program. However, 29% of respondents did not have a program, and seven percent were unaware if a program existed. For those who answered “other”, they indicated that only some hotel properties under their management had sustainability programs.

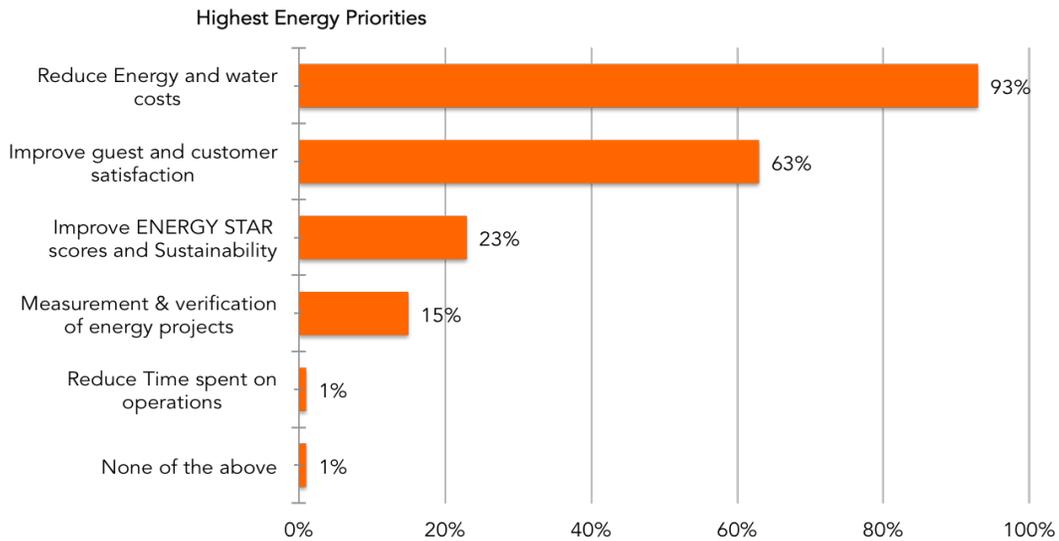


42% of respondents did not know how much cost savings was created by their hotels' sustainability programs, although this percentage is partially caused by the respondents who indicated they did not have a sustainability program. However, considering many respondents' hotels did not have any EMS, it makes sense that the impact of sustainability initiatives is not being measured. Slightly more respondents, 27% saved more than 5% in energy expenses, and 24% saved less than 5%.

Reasons and Priorities for Sustainability and Efficiencies:



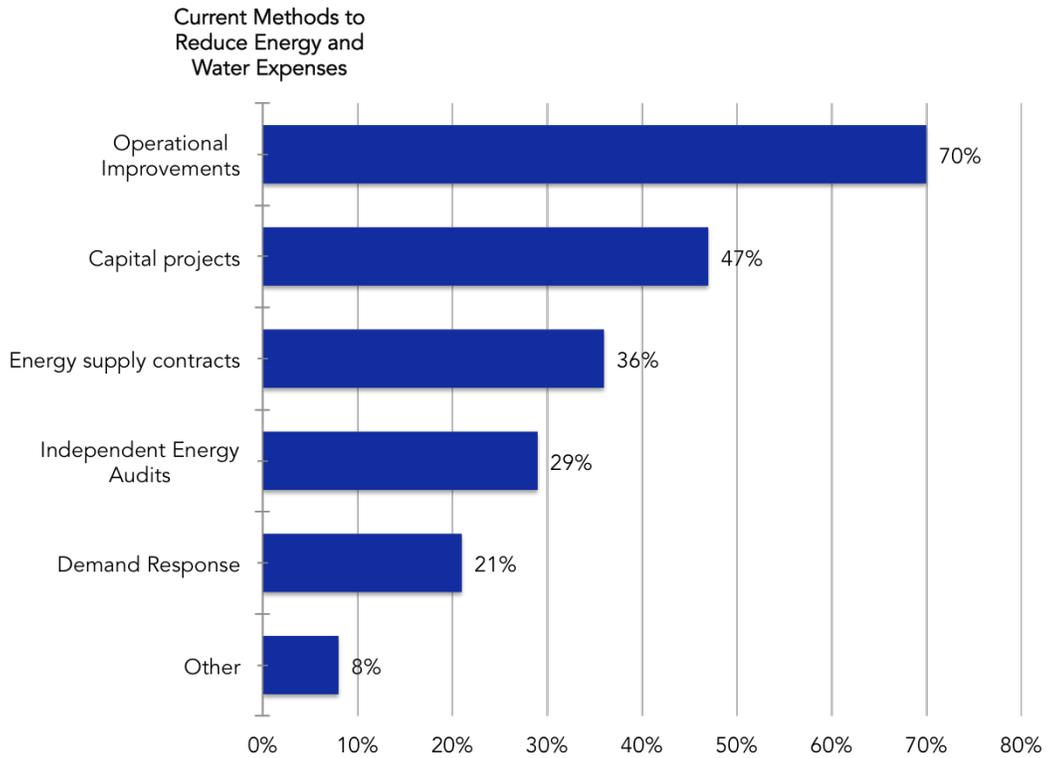
The answers to why a respondent might consider a sustainability program get to the heart of hotel professionals' motivations concerning energy efficiency. Consistently, profit gains were the forefront for hotel professionals; by far the two most common reasons for adopting a water and energy reduction program were that it would reduce expenses and increase asset value. As noted before, reducing costs and expenses came first; 80% of respondents affirmed that saving money and increasing asset value was a priority. The second-most selected reason, at 39% was that guests had either expressed interest or required a program to improve sustainability, suggesting that the drivers improved energy efficiency are external. Environmental impact was not completely irrelevant to these hotel professionals however: 25% indicated that ENERGY STAR score or LEED requirements were significant factors, and 20% of respondents were motivated to reduce carbon dioxide emissions. Fewer were concerned about state or local regulations. 20% were entirely uninterested in sustainability programs. Those who selected "other" usually reported that they were not decision-makers when it came to matters of sustainability.



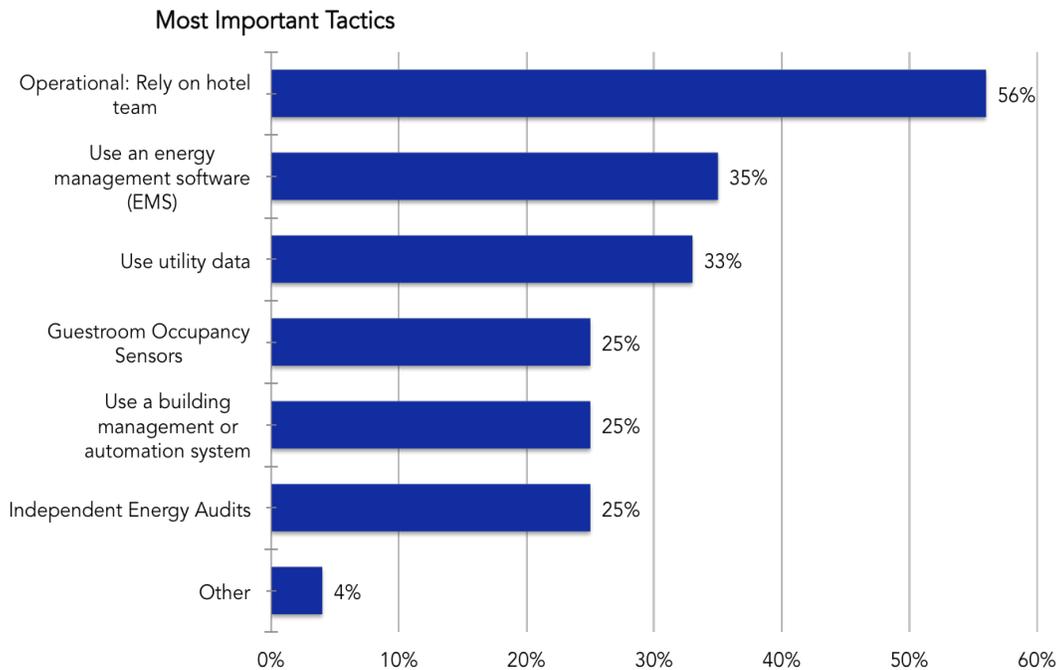
When it comes to energy-related priorities, profitability plays a crucial role for hotel professionals. 93% of respondents selected the reduction of energy and water costs as one of their most important energy goals. Also important was the guest experience, as 63% cited improving customer satisfaction as a top priority. Following the trend evident throughout this survey, ENERGY STAR scores, LEED certification and measurement and verification (M&V) were less prevalent concerns. Even fewer respondents, one percent, were concerned about how much time they spent on energy management; not surprisingly, as many of our respondents reported they spent less than two hours on such activities.

When responses to this question were broken down by job title for analysis, we found a consistent ranking of importance across the whole board of surveyed professionals among the top three reasons: reduce energy and water cost, improve guest and customer satisfaction, and improve ENERGY STAR scores and sustainability. 83% (of Operations Managers) was the lowest percentage among the seven types of positions who thought cost reduction was a major reason, while the highest reached 100%.

Methods and Tactics:

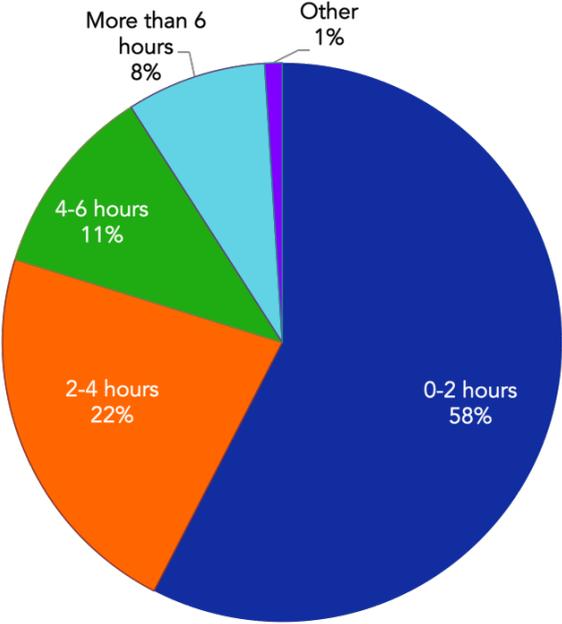


Throughout the survey, respondents conveyed the importance of operational adjustments within their hotels to improve efficiency and reduce energy and water expenses. Far fewer utilized methods like capital projects, energy supply contracts, independent energy audits and demand response. After operational improvements at 70%, capital projects for systems such as occupancy sensors or smart lighting were the next most common at 47%. When specifying other methods, several respondents answered that their hotels had no methods to reduce energy and water use, and others mentioned LED lights and solar thermal panels. 21% of respondents used demand response to reduce water and energy expenses.



For our hotel professional respondents, the daily work of the operations team inside the hotel was the main force behind energy efficiency. Earlier answers suggested operational improvements were the most common methods to reduce energy and water use, and the responses here dominantly highlighted the operations team in the hotel as an essential key to efficiency. 56% said they relied on the hotel team, but 35% or less indicated that they used other methods such as guestroom occupancy sensors, building automation systems, EMS, utility data or independent energy audits. Many respondents did not know the energy costs of their common areas or the savings from their sustainability programs, and one explanation is that based on these answers, few hotels utilize energy efficiency methods with measurement or verification abilities, which is provided by EMS. In several instances throughout the survey, respondents reported the use of independent audits. Therefore, EMS could be a welcome opportunity for hotels to bring their energy performance analyses in-house.

Monthly Time Effort on Various Hotel Energy Management Activities
(Budgeting, ENERGY STAR updates, variance reporting, billing)



For the surveyed hotel professionals, energy (or water) management activities did not occupy a great portion of their time. 58% of respondents spent two hours or less a month. 22% of respondents spent between two and four hours a month. Yet, for the 19% of surveyed professionals that spent more than four hours a month, energy management proved to be an arduous undertaking.