

Analysis and Key Findings from EPA’s Review of the ENERGY STAR Model for Hotel Properties

On August 26, 2018, EPA updated the ENERGY STAR score models and related performance metrics for U.S. buildings in ENERGY STAR Portfolio Manager® based on the most recent market data available. The data shows that energy use and business practices in U.S. commercial buildings have undergone substantial change since EPA last updated the ENERGY STAR score models. These important changes require that EPA update the score models so that they are as reflective as possible of current market trends and performance.

On September 13, 2018, EPA implemented a review period, during which we solicited feedback on the application of the models to various commercial building sectors and the resulting scores. The review period included three phases: gathering feedback; analyzing the models and evaluating score changes on buildings benchmarking in Portfolio Manager; and communicating the results. With this document, we are communicating the results and concluding our review period for the hotel ENERGY STAR model.

During the feedback phase, we heard from several partners about trends they observed in the scores of their buildings. This feedback was helpful during the analysis phase. After extensive analysis, we determined that the model is scoring hotels properly.

Background on Underlying Industry Data

The current model for hotels was developed using data collected for the Energy Information Administration’s (EIA) 2012 Commercial Building Energy Consumption Survey (CBECS). The previous model was developed using data from the 2003 CBECS. EPA had planned to update the model in the intervening years, using data from a 2007 CBECS. However, EIA did not publish the 2007 survey data, after determining that it did not meet their rigorous quality standards.

Between 2003 and 2012, the estimated number of hotel buildings in the United States increased by 14%. During that period, the average site EUI decreased by 3% while the source EUI increased by 7%.

Changes in U.S. Lodging Buildings (CBECS Data)

CBECS Year	Number of Lodging Buildings in US	Floorspace (million sf)	Average Site EUI	Average Source EUI*
2003	142,000	5,096	100.0	180.4*
2012	158,000	5,826	96.9	193.7*

*Calculated using new ENERGY STAR source factors from August 2018

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Review Period Key Findings

Key Finding #1: The model is working as intended

After extensive analysis, EPA has concluded that the Hotel model is working as intended to deliver appropriate energy performance metrics. Based on these results, no further changes have been made to the performance metrics released in August 2018. ENERGY STAR certification for hotels will resume on May 1, 2019.

Key Finding #2: The current model reflects hospitality market differentiation

Hotels with low room density often represent upscale hotels with more space devoted to common areas, such as lobbies, corridors, conference rooms, and banquet space. These hotels also tend to have higher energy use intensity than other types of hotel properties. Owners and managers of upscale hotels have suggested that the previous model did not adequately reflect the lower room density and amenities that their businesses require. The current model better reflects this market differentiation and scores hotels with different room densities relatively evenly.

The rest of this document provides additional details about the ENERGY STAR model for Hotel properties and the results of the score review analysis.

Summary of Review Period Feedback, Analysis, and Findings

During the review period, we solicited feedback from all Portfolio Manager users and ENERGY STAR partners. In total, we received six survey responses from organizations that have hotel properties as part of their building portfolio. Of these, one noted that scores for hotel properties had increased slightly, and one provided substantive feedback regarding the variation in score changes among hotel properties in their portfolio.

An individual hotel's change in score is the result of interactions among the components of the model, and difficult to attribute to a single factor. The fuel mix of a building, the amount of energy used, the building activity level, and how the combination of these factors compares to the U.S. population of hotels on a percentile scale all influence the change in score.

In developing the current hotel model, EPA analyzed the potential impact of dozens of factors on hotel energy use. The final model adjusts for those listed in the table below, which shows that the factors included in the model have not changed from the previous model to the current model.



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Changes in Hotel Model Adjustments

Adjustments in Previous Hotel Model Based on 2003 CBECS	Kept?	Adjustments in Current Hotel Model Based on 2012 CBECS
Number of Rooms per 1,000 square feet	✓	Number of Rooms per 1,000 square feet
Number of Workers per 1,000 square feet.	✓	Number of Workers per 1,000 square feet
Presence of Commercial Food Preparation (yes/no)	✓	Presence of Commercial Food Preparation (yes/no)
Number of Open/Closed/Walk-in Refrigerators and Icemakers per 1,000 square feet	✓	Number of Open/Closed/Walk-in Refrigerators and Icemakers per 1,000 square feet
Percent of the Building that is Heated and Cooled	✓	Percent of the Building that is Heated and Cooled
Weather and Climate (using Heating and Cooling Degree Days)	✓	Weather and Climate (using Heating and Cooling Degree Days)

Our analysis found that room density is an important factor in score variation from the previous to the current model, as discussed below.

Upscale hotels tended to see an increase in scores

While the amenity category of a hotel is not tracked in Portfolio Manager, it is generally correlated with the number of guest rooms per 1,000 square feet (room density). Hotels with low room density often represent upscale hotels with more space devoted to common areas, such as lobbies, corridors, conference rooms, and banquet space, and tend to use more energy per square foot than other types of hotel properties. These types of hotels experienced a relatively large increase in scores.

In the table below, the second column shows that the previous ENERGY STAR score for hotels in Portfolio Manager was lower on average for hotels with low room density. The current model applies a flat adjustment for room densities below 3 rooms per 1,000 square feet and an additional adjustment for hotels with a room density above 3, up to a maximum adjustment at a value of 4 (a more detailed explanation is available here). The average scores in Portfolio Manager with the current model demonstrate that it scores hotels of all values of room density relatively evenly. Similarly, the percent of properties scoring 75 or above with the current model is more even across all hotel room density values.

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Room Density (per 1,000 sq. ft.)	Average Score Previous Hotel Model	Average Score Current Hotel Model	Percent scoring 75 or above (Previous Model)	Percent scoring 75 or above (Current Model)
Less than 1.5	46	53	21%	31%
1.5 - 2.5	57	55	29%	28%
2.5 +	59	56	29%	31%
All	53	54	26%	30%

Other variables were studied and found to be appropriately accounted for in the model

Prior to releasing the current score model in August 2018, EPA evaluated many other building and operating characteristics to ensure the model scores different types of hotels appropriately. During the review period, we verified that the current model produces more balanced scores than the previous model for hotels across the range in terms of number of workers, climates, regions, year of construction, and more.

The results fall within the expected average score and percentile distribution

The ENERGY STAR score is intended to represent a percentile ranking of the hotel building population, with a score of 50 indicating a hotel with median energy performance, and a score of 75 – 100 indicating performance in the top 25% of the hotel building population.

In the current hotel ENERGY STAR model, the average score is 54, and 30% of hotels score 75 or above. In the previous model, the average score was 53, and 26% of hotels were scoring 75 or above, as illustrated in the table below.

Average Hotel Score and Percent with a Score Above 75 (Portfolio Manager buildings)

	Average ENERGY STAR Score	Percent scoring 75 or above
Previous Hotel Model	53	26%
Current Hotel Model	54	30%

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Additional Resources

- [General Information on ENERGY STAR Score Updates](#)
- [ENERGY STAR Score for Hotels Technical Reference](#)