ENERGY STAR® PortfolioManager®

Technical Reference

ENERGY STAR Score for Multifamily Housing in the United States

OVERVIEW

The ENERGY STAR Score for Multifamily Housing applies to buildings that contain 20 or more residential living units. The objective of the ENERGY STAR score is to provide a fair assessment of the energy performance of a property relative to its peers, taking into account the climate, weather, and business activities at the property. To identify the aspects of building activity that are significant drivers of energy use and then normalize for those factors, a statistical analysis of the peer building population is performed. The result of this analysis is an equation that will predict the energy use of a property, based on its experienced business activities. The energy use prediction for a building is compared to its actual energy use to yield a 1 to 100 percentile ranking of performance, relative to the national population.

- **Property Types.** The ENERGY STAR score for multifamily housing applies to residential buildings that contain 20 or more residential living units. The score applies to individual buildings as well as properties with multiple buildings.
- **Reference Data.** The analysis for multifamily housing is based on survey data from an industry survey conducted by the Federal National Mortgage Association ("Fannie Mae").
- **Adjustments for Weather and Business Activity.** The analysis includes adjustments for:
    - Number of Units
    - Number of Bedrooms Per Unit
    - Weather and Climate (using Heating and Cooling Degree Days, retrieved based on Zip code)
    - Percentage of units located in Low-Rise buildings
- **Release Date.** The ENERGY STAR score for multifamily housing was released in September 2014.

This document presents details on the development of the 1 - 100 ENERGY STAR score for multifamily housing properties. More information on the overall approach to develop ENERGY STAR scores is covered in our Technical Reference for the ENERGY STAR Score, available at www.energystar.gov/ENERGYSTARScore. The subsequent sections of this document offer specific details on the development of the ENERGY STAR score for multifamily housing:

REFERENCE DATA & FILTERS

For the ENERGY STAR score for multifamily properties, the reference data used to establish the peer building population in the United States is Fannie Mae's *Multifamily Energy and Water Market Research Survey*. This survey was part of Fannie Mae's Multifamily Green Initiative to improve energy and water efficiency and enhance environmental and financial sustainability of multifamily housing properties. The survey was conducted in 2012 and 2013, and collected whole building energy consumption data for the calendar year 2011. While a total of 1,163 properties participated in the survey, many of these provided data on water only, or benchmarked part of their energy (e.g., common areas) but not the whole building. There were 559 observations that provided whole building energy data. This subset was further filtered for those that had complete energy data (e.g., 12 months for all fuels) and provided key operational parameters like Floor Area, Number of Units, Number of Bedrooms, and Zip Code – this resulted in a dataset of 350 observations. The majority of buildings were removed either because they did not specify the number of bedrooms (109 removed) or did not indicate if they were low, mid, or high-rise (62 removed).

Starting from this complete dataset of 350 properties, we applied additional filters according to the standard EPA protocol. This review evaluates possible filters in four categories: Building Type Filters, Program Filters, Data Limitation Filters, and Analytical Filters. A complete description of each of these categories is provided in our Technical Reference for the ENERGY STAR Score, at www.energystar.gov/ENERGYSTARScore. ***Figure 1*** presents a summary of each filter applied in the development of the ENERGY STAR score for multifamily housing, the rationale behind the filter, and the resulting number of properties in the data set after the filter is applied. After all filters are applied, the remaining data set has 322 properties.

Figure 1 – Summary of Filters for the ENERGY STAR Score for Multifamily Housing

Condition for Including an Observation in the Analysis	Rationale	Number Remaining
Must have complete data for whole-property energy use and operating characteristics	EPA Program Filter – Complete data is necessary for analysis	350
Must have at least 20 units	Analytical filter – Analysis could not model behavior for buildings with fewer than 20 units, due to limited data	342
Source EUI must be less than 290 kBtu/ft^2	Analytical filter – Values determined to be data entry errors or statistical outliers	333
Gross Floor area must be no more than 2,000,000 ft^2	Analytical filter – Values determined to be data entry errors or statistical outliers	332
Unit density must be less than 2.75 units per 1,000 square feet	Analytical filter – Values determined to be data entry errors or statistical outliers	324
Bedroom Density must be more than 0.5 and less than 3.5 bedrooms per 1,000 square feet	Analytical filter – Values determined to be data entry errors or statistical outliers	322

Of the filters applied to the reference data, some result in constraints on calculating a score in Portfolio Manager and others do not. Building Type and Program Filters are used to limit the reference data to include only properties that are eligible to receive a score in Portfolio Manager, and are therefore related to eligibility requirements. In contrast,

Data Limitation Filters account for limitations in the data availability, but do not apply in Portfolio Manager. Analytical Filters are used to eliminate outlier data points or different subsets of data, and may or may not affect eligibility. In some cases, a subset of the data will have different behavior from the rest of the properties in which case an Analytical Filter will be used to determine eligibility in Portfolio Manager. In other cases, Analytical Filters exclude a small number of outliers with extreme values that skew the analysis, but do not affect eligibility requirements. A full description of the criteria you must meet to get a score in Portfolio Manager is available at www.energystar.gov/EligibilityCriteria.

Related to the filters and eligibility criteria described above, another consideration is how Portfolio Manager treats buildings that are collectively part of a single housing community. The main unit for benchmarking in Portfolio Manager is the property, which may be used to describe either a single building or multiple associated buildings. The applicability of the ENERGY STAR score depends on the type of property. For multifamily housing properties, the score applies to the entire housing community, whether it is one building or a campus of 10 buildings. In the case of a campus, the score applies to the entire campus because each building on the campus may be needed to define the complete property use. For example, the leasing office or laundry facilities may only be located in one building but are integral to the community as a whole. Therefore, for properties with multiple buildings, the entire property will receive a 1 – 100 ENERGY STAR score. Single-building multifamily housing properties are also eligible for an ENERGY STAR score.

Survey Weights

As compared with the national population, the Fannie Mae sample exhibits a large number of properties in New York City and a large number of properties with 300 or more units. Therefore, rather than being a representative random sample of the population, the survey can be viewed as a stratified random sample, with multiple groups of respondents. In order to properly account for this stratification, survey sample weights were constructed to reflect the probability of being selected within each group. Observations were divided into several strata based on location and number of units. The survey weights are structured by region (Northeast vs. Non-Northeast) and by Number of Units (20-99 units, 100-299 units, 300+ units). Within each of the six strata identified, the weight of an individual observation was computed as:

Observation Weight = Total Size of Population in Group/Number of Responses in Group

The Total Size of Population in Group was obtained through data supplied by the 2001 Residential Finance Survey from the US Census Bureau. Detailed information on this survey, including complete data files, is available at http://www.census.gov/housing/rfs/. The Number of Responses in Group was counted using the population of 342 observations that met the “complete” data filters and also contained 20 or more units (See Figure 1, above).

Initially, EPA examined smaller unit ranges, going down to 5 units. However, because there were fewer than 10 properties in the survey that had fewer than 20 units, it was determined that there were too few observations in the Fannie Mae survey to adequately represent the national population of properties with fewer than 20 units. Given this limitation, EPA decided to exclude properties with less than 20 units from the sample set, which means the ENERGY STAR score only applies to multifamily housing properties that are at least 20 units in size.

VARIABLES ANALYZED

To normalize for differences in business activity, we perform a statistical analysis to understand what aspects of building activity are significant with respect to energy use. The filtered reference data set described in the previous

section is analyzed using a weighted ordinary least squares regression, which evaluates energy use relative to business activity (e.g., unit density, bedroom density, and climate). This linear regression yields an equation that is used to compute energy use (also called the dependent variable) based on a series of characteristics that describe the business activities (also called independent variables). This section details the variables used in the statistical analysis for multifamily housing.

Dependent Variable

The dependent variable is what we try to predict with the regression equation. For the multifamily housing analysis, the dependent variable is energy consumption expressed in source energy use intensity (source EUI). This is equal to the total source energy use of the property divided by the gross floor area. The regressions analyze the key drivers of source EUI – those factors that explain the variation in source energy use per square foot in multifamily housing.

Independent Variables

The reference survey collects numerous property operating characteristics that were identified as potentially important for multifamily housing. Based on a review of the available variables in the data, in accordance with the criteria for inclusion in Portfolio Manager,[1] the following variables were analyzed:

- Number of Buildings
- Building Type
- Square Footage
- Number of Floors
- Number of Units
- Number of Bedrooms
- Number of Buildings
- Resident Population
- Percent Occupied
- Presence of Parking
- Presence of a Swimming Pool
- Number of Elevators
- Presence of an Outdoor Recreation Area
- Presence of a Fitness Center
- Percent Common Area
- Number of Computers in Common Areas
- Presence of Commercial Cooking
- Number of Commercial Refrigeration Units
- Presence of Laundry
- Laundry Location (In-Unit vs. Common Area)
- Number of Laundry Hook-Ups
- Presence of Dishwasher
- Dishwasher Location (In-Unit vs. Common Area)
- Number of Dishwasher Hook-Ups
- Number of Expected Occupants

[1] For a complete explanation of these criteria, refer to our Technical Reference for the ENERGY STAR Score, at www.energystar.gov/ENERGYSTARScore.

- Heating Degree Days
- Cooling Degree Days

We perform extensive review on all of these operational characteristics. In addition to reviewing each characteristic individually, characteristics are reviewed in combination with each other. As part of the analysis, some variables are reformatted to reflect the physical relationships of building components. For example, the total number of units on a property is typically evaluated in a density format. The number of residential units *per square foot* (not the gross number of units) is expected to be correlated with the energy use per square foot. In addition, based on analytical results and residual plots, variables are examined using different transformations (such as the natural logarithm, abbreviated as Ln). The analysis consists of multiple regression formulations. These analyses are structured to find the combination of statistically significant operating characteristics that explain the greatest amount of variance in the dependent variable: source EUI.

The final regression equation includes the following variables:

- Number of Units per 1,000 square feet
- Number of Bedrooms per Unit
- Total Heating Degree Days
- Total Cooling Degree Days
- Low-Rise building (yes/no)

These variables are used together to compute the predicted source EUI for multifamily housing. The predicted source EUI is the mean EUI for a hypothetical population of buildings that share the same values for each of these variables. That is, the mean energy use for a building that operates just like your building. There were several variables for which EPA did not have adequate data to make a determination regarding inclusion in the model. For instance, Fannie Mae collected data on activities like fitness areas and computers in common areas, but the majority of respondents did not answer these questions. Percent occupancy is another example of a variable for which there was inadequate data. In the absence of adequate data, EPA cannot adjust for these characteristics.

Analysis of High, Mid, and Low-Rise Buildings

Multifamily building height was analyzed closely, in particular because this was raised as an area of interest among leading organizations in the sector. Each observation in the analysis was designated as either low-rise (1-4 stories), mid-rise (5-9 stories), or high-rise (10 or more stories). The analysis shows that low-rise buildings tend to have lower energy use intensity (EUI) – a result that is observed in Portfolio Manager data as well as in Fannie Mae data.

Before deciding on the final regression model with a low-rise term, we solicited input from industry and considered the different physical explanations for why low-rise buildings may use less energy and whether it was appropriate to adjust for this in the ENERGY STAR score. Based on the input we received, we determined that there were some operational differences for low-rise buildings that were important to adjust for. Most specifically, low-rise buildings generally have less “hallway” space (i.e., interior corridors) than high-rise; and low-rises are expected to have fewer common areas and amenities. These types of operational differences between high- and low-rise buildings support the need for an adjustment in the ENERGY STAR score.

At this time, multifamily housing is the only property type for which the ENERGY STAR score includes a height adjustment. Typically, we do not include this type of adjustment because there is no expected operational difference between a taller and shorter building and/or because height does not have a statistically significant effect on EUI. For example, the ENERGY STAR score for office does not have a height adjustment for both of these reasons: there are

not expected to be major operational/floor plan differences between taller and shorter buildings and a flag for high rise is not significant when added to our existing regression model.

In our analysis, each property was 100% low-rise, mid-rise or high-rise. However, in Portfolio Manager, it is possible for a community to have buildings of different heights. Therefore, the low-rise variable is determined as the percentage of the property's units that are in a low-rise building. For instance, if a property consists of two buildings—one mid-rise building with 60 units and one low-rise building with 40 units—the low-rise variable value will be 0.4 (low-rise = 40/(60+40) = 0.4).

Laundry and Dishwashers

Our analysis looked closely at the variables related to laundry and dishwasher use, but did not conclude that these characteristics should be included in the multifamily model. In the case of laundry, many respondents did not provide information about their laundry configuration. In addition, among those who did respond, 94% had laundry in the building. Because most people who answered this question said the same thing, it was not possible to determine a statistically significant difference between buildings that did have laundry and those that did not.

For dishwashers, it was determined that including this variable would not be consistent with the ENERGY STAR approach. All households create and wash dirty dishes in their homes. Whether they choose to do so by hand or by dishwasher is a discretionary choice. To the extent there is an energy difference, this will be reflected in the measured energy, and therefore in the ENERGY STAR score.

Testing

Finally, we test the regression equation using actual multifamily housing buildings that have been entered in Portfolio Manager. This provides another set of buildings to examine in addition to the Fannie Mae data, to see the average ENERGY STAR scores and distributions, and to assess the impacts and adjustments. This analysis provides a second level of confirmation that the final regression equation produces robust results that are unbiased with respect to the key operational characteristics such as unit density, bedrooms per unit, and heating and cooling degree days.

It is important to reiterate that the final regression equation is based on the nationally representative reference data, not data previously entered into Portfolio Manager.

REGRESSION EQUATION RESULTS

The final regression is a weighted ordinary least squares regression across the filtered data set of 322 observations. The dependent variable is source EUI. Each independent variable is centered relative to the mean value, presented in ***Figure 2***. The final equation[2] is presented in ***Figure 3***. All variables in the regression equation are significant at the 99% confidence level or better, as shown by the significance levels.

The regression equation has a coefficient of determination (R^2) value of 0.2298, indicating that this equation explains 22.98% of the variance in source EUI for multifamily housing properties. Because the final equation is structured with energy per square foot as the dependent variable, the explanatory power of square foot is not included in the R^2

[2] The lookup table and model coefficients were adjusted in 2018 to account for updated ratios used in Portfolio Manager to convert site energy to source energy. The new source-site ratios were applied to the underlying dataset, resulting in changes to the model coefficients, lookup table, and R^2 value.

value, thus this value appears artificially low. Re-computing the R^2 value in units of source energy[3] demonstrates that the equation actually explains 91.98% of the variation of source energy of multifamily properties. This is an excellent result for a statistically-based energy model.

Detailed information on the ordinary least squares regression approach is available in our Technical Reference for the ENERGY STAR Score, at www.energystar.gov/ENERGYSTARScore.

Figure 2 - Descriptive Statistics for Variables in Final Regression Equation

Variable	Mean	Minimum	Maximum
Source EUI (kBtu/ft²)	121.4	14.86	260.4
Unit Density	1.215	0.2664	2.504
Bedrooms per Unit	1.238	1.000	2.990
HDD	4,233	429.2	8,326
CDD	1,364	29.60	4,602
Low Rise	0.4867	0.000	1.000

Figure 3 - Final Regression Results

Summary				
Dependent Variable	Source Energy Intensity (kBtu/ft²)			
Number of Observations in Analysis	322			
R^2 Value	0.2298			
Adjusted R^2 value	0.2176			
F Statistic	18.85			
Significance (p-level)	<0.0001			
	Unstandardized Coefficients	**Standard Error**	**T value**	**Significance (p-level)**
Constant	130.7	2.705	48.3	<0.0001
C_Unit Density	48.01	6.416	7.483	<0.0001
C_Bedrooms per Unit	22.64	5.700	3.972	<0.0001
Low Rise	- 19.00	3.976	- 4.777	<0.0001
C_HDD	0.008989	0.001502	5.983	<0.0001
C_CDD	0.01406	0.002494	5.638	<0.0001

Notes:
- *The regression is a weighted ordinary least squares regression*
- *The prefix C_ on each variable indicates that it is centered. The centered variable is equal to difference between the actual value and the observed mean. The observed mean values are presented in Figure 2.*
- *Low Rise is a yes/no variable (1 for yes, 0 for no). A building is defined as low rise (Yes) if it is no taller than 4 stories (e.g., 1-4 stories).*

[3] The R^2 value in Source Energy is calculated as: 1 – (Residual Variation of Y) / (Total Variation of Y). The residual variation is sum of $(\text{Actual Source Energy}_i - \text{Predicted Source Energy}_i)^2$ across all observations. The Total variation of Y is the sum of $(\text{Actual Source Energy}_i - \text{Mean Source Energy})^2$ across all observations.

ENERGY STAR SCORE LOOKUP TABLE

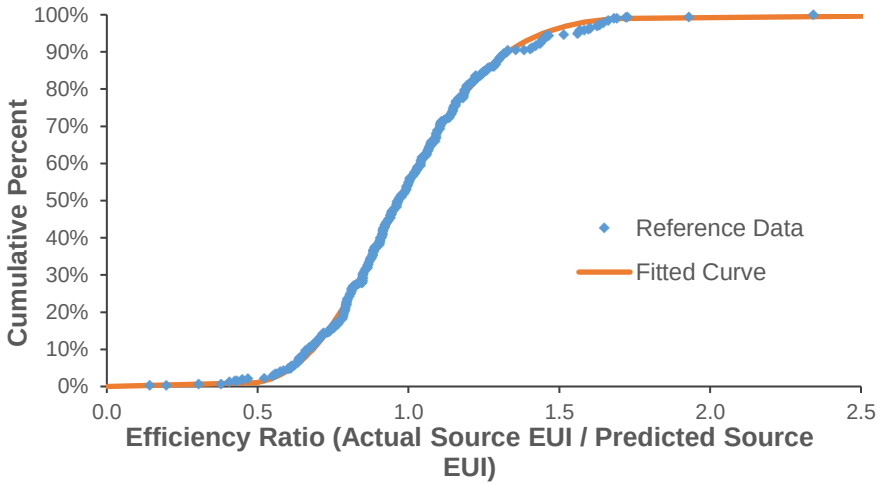
The final regression equation (presented in ***Figure 3***) yields a prediction of source EUI based on a property's operating characteristics. Some properties in the reference data sample use more energy than predicted by the regression equation, while others use less. The *actual* source EUI of each reference data observation is divided by its *predicted* source EUI to calculate an energy efficiency ratio:

$$Energy\ Efficiency\ Ratio = \frac{Actual\ Source\ EUI}{Predicted\ Source\ EUI}$$

A lower efficiency ratio indicates that a building uses less energy than predicted, and consequently is more efficient. A higher efficiency ratio indicates the opposite.

The efficiency ratios are sorted from smallest to largest and the cumulative percent of the population at each ratio is computed using the individual observation weights from the reference data set. ***Figure 4*** presents a plot of this cumulative distribution. A smooth curve (shown in orange) is fitted to the data using a two parameter gamma distribution. The fit is performed in order to minimize the sum of squared differences between each building's actual percent rank in the population and each building's percent rank with the gamma solution. The final fit for the gamma curve yielded a shape parameter (alpha) of 15.13 and a scale parameter (beta) of 0.06561. For this fit, the sum of the squared error is 0.02879.

Figure 4 – Distribution for Multifamily Housing



The final gamma shape and scale parameters are used to calculate the efficiency ratio at each percentile (1 to 100) along the curve. For example, the ratio on the gamma curve at 1% corresponds to a score of 99; only 1% of the population has a ratio this small or smaller. The ratio on the gamma curve at the value of 25% will correspond to the ratio for a score of 75; only 25% of the population has ratios this small or smaller. The complete score lookup table is presented in ***Figure 5***.

Figure 5 – ENERGY STAR Score Lookup Table for Multifamily

ENERGY STAR Score	Cumulative Percent	Energy Efficiency Ratio > =	Energy Efficiency Ratio <	ENERGY STAR Score	Cumulative Percent	Energy Efficiency Ratio >=	Energy Efficiency Ratio <
100	0%	0.0000	0.4965	50	50%	0.9709	0.9772
99	1%	0.4965	0.5412	49	51%	0.9772	0.9836
98	2%	0.5412	0.5709	48	52%	0.9836	0.9900
97	3%	0.5709	0.5941	47	53%	0.9900	0.9964
96	4%	0.5941	0.6134	46	54%	0.9964	1.0029
95	5%	0.6134	0.6301	45	55%	1.0029	1.0094
94	6%	0.6301	0.6451	44	56%	1.0094	1.0160
93	7%	0.6451	0.6587	43	57%	1.0160	1.0227
92	8%	0.6587	0.6712	42	58%	1.0227	1.0294
91	9%	0.6712	0.6829	41	59%	1.0294	1.0361
90	10%	0.6829	0.6938	40	60%	1.0361	1.0430
89	11%	0.6938	0.7042	39	61%	1.0430	1.0499
88	12%	0.7042	0.7141	38	62%	1.0499	1.0569
87	13%	0.7141	0.7236	37	63%	1.0569	1.0640
86	14%	0.7236	0.7327	36	64%	1.0640	1.0712
85	15%	0.7327	0.7415	35	65%	1.0712	1.0785
84	16%	0.7415	0.7500	34	66%	1.0785	1.0860
83	17%	0.7500	0.7582	33	67%	1.0860	1.0935
82	18%	0.7582	0.7662	32	68%	1.0935	1.1012
81	19%	0.7662	0.7741	31	69%	1.1012	1.1091
80	20%	0.7741	0.7817	30	70%	1.1091	1.1171
79	21%	0.7817	0.7892	29	71%	1.1171	1.1252
78	22%	0.7892	0.7965	28	72%	1.1252	1.1336
77	23%	0.7965	0.8037	27	73%	1.1336	1.1421
76	24%	0.8037	0.8108	26	74%	1.1421	1.1509
75	25%	0.8108	0.8177	25	75%	1.1509	1.1599
74	26%	0.8177	0.8246	24	76%	1.1599	1.1691
73	27%	0.8246	0.8314	23	77%	1.1691	1.1787
72	28%	0.8314	0.8381	22	78%	1.1787	1.1885
71	29%	0.8381	0.8447	21	79%	1.1885	1.1987
70	30%	0.8447	0.8513	20	80%	1.1987	1.2092
69	31%	0.8513	0.8578	19	81%	1.2092	1.2201
68	32%	0.8578	0.8643	18	82%	1.2201	1.2315
67	33%	0.8643	0.8707	17	83%	1.2315	1.2435
66	34%	0.8707	0.8770	16	84%	1.2435	1.2560
65	35%	0.8770	0.8834	15	85%	1.2560	1.2691
64	36%	0.8834	0.8897	14	86%	1.2691	1.2830
63	37%	0.8897	0.8960	13	87%	1.2830	1.2978
62	38%	0.8960	0.9022	12	88%	1.2978	1.3136
61	39%	0.9022	0.9085	11	89%	1.3136	1.3306
60	40%	0.9085	0.9147	10	90%	1.3306	1.3490
59	41%	0.9147	0.9209	9	91%	1.3490	1.3692
58	42%	0.9209	0.9271	8	92%	1.3692	1.3917
57	43%	0.9271	0.9334	7	93%	1.3917	1.4170
56	44%	0.9334	0.9396	6	94%	1.4170	1.4463
55	45%	0.9396	0.9458	5	95%	1.4463	1.4812
54	46%	0.9458	0.9521	4	96%	1.4812	1.5249
53	47%	0.9521	0.9583	3	97%	1.5249	1.5842
52	48%	0.9583	0.9646	2	98%	1.5842	1.6806
51	49%	0.9646	0.9709	1	99%	1.6806	>1.6806

EXAMPLE CALCULATION

As detailed in our Technical Reference for the ENERGY STAR Score, at www.energystar.gov/ENERGYSTARScore, there are five steps to compute a score. The following is a specific example for the score for multifamily housing properties:

1 User enters building data into Portfolio Manager

- 12 months of energy use information for all energy types (annual values, entered in monthly meter entries)
- Physical building information (size, location, etc.) and use details describing building activity (hours, etc.)

Energy Data	Value
Electricity	2,100,000 kWh
Natural gas	800 therms

Property Use Details	Value
Gross floor area (ft^2)	120,000
Total Number of Units	300
Total Number of Bedrooms	440
Units – Low Rise	200
Units – Mid Rise	100
Units – High Rise	0
HDD (provided by Portfolio Manager, based on Zip code)	4710
CDD (provided by Portfolio Manager, based on Zip code)	1287

2 Portfolio Manager computes the actual source EUI

- Total energy consumption for each fuel is converted from billing units into site energy and source energy
- Source energy values are added across all fuel types
- Source energy is divided by gross floor area to determine actual source EUI

Computing Actual Source EUI

Fuel	Billing Units	Site kBtu Multiplier	Site kBtu	Source kBtu Multiplier	Source kBtu
Electricity	2,100,000 kWh	3.412	7,165,200	2.80	20,062,560
Natural gas	800 therms	100	80,000	1.05	84,000
				Total Source Energy (kBtu)	20,146,560
				Actual Source EUI ($kBtu/ft^2$)	**167.9**

3 Portfolio Manager computes the predicted source EUI

- Using the property use details from Step 1, Portfolio Manager computes each building variable value in the regression equation (determining the natural log or density, or applying any minimum or maximum values used in the regression model, as necessary).
- The centering values are subtracted to compute the centered variable for each operating parameter.
- The centered variables are multiplied by the coefficients from the regression equation to obtain a predicted source EUI.

Computing Predicted Source EUI

Variable	Actual Building Value	Reference Centering Value	Building Centered Variable	Coefficient	Coefficient * Centered Variable
Constant	--	--	--	130.7	130.7
Unit Density	2.500	1.215	1.285	48.01	61.69
Bedrooms per Unit	1.467	1.238	0.2290	22.64	5.185
Low Rise	0.6667	NA	0.6667	-19.00	-12.67
HDD	4710	4233	477	0.008989	4.288
CDD	1287	1364	-77	0.01406	-1.083
				Predicted Source EUI (kBtu/ft²)	**188.1**

4 Portfolio Manager computes the energy efficiency ratio

- The ratio equals the actual source EUI (Step 2) divided by predicted source EUI (Step 3)
- Ratio = 167.9 / 188.1 = 0.8926

5 Portfolio Manager uses the efficiency ratio to assign a score via a lookup table

- The ratio from Step 4 is used to identify the score from the lookup table
- A ratio of 0.8926 is greater than or equal to 0.8897 and less than 0.8960.
- ***The ENERGY STAR score is 63.***