ENERGY STAR® Performance Ratings
Technical Methodology for Grocery Store/Supermarket

This document presents specific details on the EPA's analytical result and rating methodology for Grocery Store/Supermarket. For background on the technical approach to development of the Energy Performance Ratings, refer to *Energy Performance Ratings – Technical Methodology* (http://www.energystar.gov/ia/business/evaluate_performance/General_Overview_tech_methodology.pdf).

Model Release Date[1]

Most Recent Update: July 2008
Original Release Date: July 2001

Portfolio Manager Grocery Store/Supermarket Definition

The Grocery Store/Supermarket space type applies to facility space used for the retail sale of food and beverage products. It should not be used by restaurants, which are not eligible for a rating at this time. The total gross floor area should include all supporting functions such as kitchens and break rooms used by staff, storage areas (refrigerated and non-refrigerated), administrative areas, stairwells, atria, lobbies, etc.

Reference Data

The Grocery Store/Supermarket regression model is based on data from the Department of Energy, Energy Information Administration's 1999 and 2003 Commercial Building Energy Consumption Surveys (CBECS). Detailed information on this survey, including complete data files for both years, is publicly available at: http://www.eia.doe.gov/emeu/cbecs/contents.html. The survey results from two different years were combined to yield as large a dataset as possible.

Data Filters

General Filter Summary:

Four types of filters are applied to define the peer group for comparison and to overcome any technical limitations in the data: Building Type Filters, EPA Program Filters, Data Limitation Filters, and Analytical Filters. A complete description of each of these categories is provided in Section V of the general technical description document: *Energy Performance Ratings – Technical Methodology*. **Table 1** presents a summary of each filter applied in the development of the Grocery Store/Supermarket model, the rationale behind the filter, and the resulting number of observations after the filter is applied. After all filters are applied, the remaining data set has 49 records from the 1999 CBECS dataset and 34 from the 2003 CBECS dataset, for a total of 83 observations.

[1] Periodic updates to the model occur to reflect the most current available market data. The original model was developed using the CBECS 1992 and 1995 databases; The most current update of July 2008 reflects the CBECS 1999 and 2003 databases.

The reasons for applying filters on the use and quantity of propane are worthy of additional discussion. In CBECS, major fuel use is reported in exact quantities of consumption. However, if a building uses propane, the amount of propane is reported according to the variable PRAMT, which uses ranges rather than exact quantities (e.g. less than 100 gallons, 100 to 500 gallons, etc.) Therefore, the quantity must be estimated within the range. To limit error associated with this estimation, EPA applies two limits to the propane quantity.

1. The quantity of propane expressed by PRAMT must be 1000 gallons or smaller.
2. The value of propane cannot account for more than 10% of the total source energy use. Because the exact quantity of propane is not reported, this cap ensures that the quantity of propane entered will not introduce undue error into the calculation of total energy consumption. In order to apply this 10% limitation, the value at the high end of the propane category is employed (e.g. for the category of less than 100, a value of 99 is used). If the 10% cap is not exceeded, then EPA will use the value at the middle of the range to calculate total energy use (e.g. for the category of less than 100, a value of 50 is used).

Table 1 Summary of Grocery Store/Supermarket Filters			
Condition for Including an Observation in the Analysis	**Rationale**	**Number Remaining CBECS 1999**	**Number Remaining CBECS 2003**
Filters used to define the ENERGY STAR Population			
PBAPLUS7 = 16 or PBAPLUS8 = 14	Building Filter – The category "Grocery Store/Food Mart is coded as PBAPLUS7=16 (1999 set) and PBAPLUS8=14 (2003 set).	74	63
Must operate for at least 30 hours per week	EPA Program Filter – Baseline condition for being a full time supermarket.	74	63
Must operate for at least 10 months per year	EPA Program Filter – Baseline condition for being a full time supermarket.	70	59
A single activity must characterize greater than 50% of the floor space[2]	EPA Program Filter – In order to be considered part of the supermarket peer group, more than 50% of the building must be Supermarket/Food Sales.	68	55
Must have at least 1 personal computer or cash register	EPA Program Filter – Baseline condition for being a full time supermarket.	60	54
Must have commercial refrigeration equipment[3]	EPA Program Filter – Baseline condition for being a full time supermarket.	58	53
Must have square foot >= 5,000	Analytical Limitation Filter– Analysis could not model behavior for buildings smaller than 5,000 ft^2.	53	35
Additional data limitation filters used to define the Modeling Population			
If propane is used, the amount category (PRAMTC) must equal 1, 2, or 3	Data Limitation Filter – Cannot estimate propane use if it is "greater than 1000" or unknown.	50	34
If propane is used, the maximum estimated propane amount must be 10% or less of the total source energy	Data Limitation Filter – Because propane values are estimated from a range, propane is restricted to 10% of the total source energy.	50	34
Must not use chilled water	Data Limitation Filter – CBECS does not collect quantities of chilled water.	50	34
Source EUI must be greater than 100 kBtu/ft^2	Analytical Limitation Filter – Data determined to be statistical outliers.	49	34

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[2] This filter is applied by a set of screens. If the variable ONEACT=1, then one activity occupies 75% or more of the building. If the variable ONEACT=2, then the activities in the building are defined by ACT1, ACT2, and ACT3. One of these activities must be coded as food sales (for the 1999 set, PBAX7=13; for the 2003 set, PBAX8=14), with a corresponding percent (ACT1PCT, ACT2PCT, ACT3PCT) that is greater than 50.
[3] For the 1999 dataset, this can be determined by the variable RFGEQP; a value of 1 indicates the presence of open cases, closed cases, or walk-in refrigeration. For the CBECS 2003 data set, this must be determined by a "yes" answer (i.e. a value of 1) to for the presence of open cases (RFGOP8), closed cases (RFGCL8), *or* walk-in refrigeration (RFGWI8).

Combining Survey Years:
Before any filters are applied, there are fewer than 75 observations in each survey year. To increase the number of observations for a superior analysis, the most recent two survey years are combined (1999 and 2003). In the CBECS data for each year, every observation has a weight. For a given year the sum of all CBECS survey weights represents the total number of supermarkets in the country. When two years are combined, the weights in each survey year must be adjusted so that the weights in the combined data set add up to this same total number of supermarkets. The process of creating these combined weights involves a few steps, in order to make sure the population is correctly represented. The combination depends on the filters, which are used to characterize the population of supermarkets in two ways (as shown in **Table 1**):

1. ENERGY STAR Population. This population is defined by the Building Filter, EPA Program Filters, and any analytical limitation filters that systematically restrict the population. The filters in this section define the set of supermarkets that are eligible to earn a rating in Portfolio Manager. These conditions must be met by any building in order to receive an energy performance rating (e.g. a building must be at least 5,000 square foot and open 30 hours per week). The sum of the CBECS weights across this population represents the size of the population covered by the ENERGY STAR performance ratings.
2. Modeling Population. This population reflects additional filters which are applied to address data limitations (such as missing or estimated data, or statistical outliers). These restrictions (e.g. must not used chilled water) do ***not*** apply as criteria for a building to see an energy performance rating in Portfolio Manager. However, due to the CBECS data limitation, these observations cannot be included in the analysis.

Theoretically, the regression analysis should include all observations in the ENERGY STAR Population. However, due to CBECS data limitations some additional observations must be removed to define the Modeling Population. The first stage of calculating a combined weight is to adjust the weights in the Modeling Population upward for each survey year. This process results in interim weights. The sum of these interim weights across the Modeling Population should equal the original sum weights across of ENERGY STAR population. The second stage is to adjust the interim weights proportionally so that each year's modeling sample is weighted to represent the same ENERGY STAR Population[4]. This process can be broken into the following 5 steps (corresponding calculations are presented in **Table 2**):

1. Identify the *ENERGY STAR Population* in each data year.
    a. Sum the weights across this population for each data year. For the 1999 survey year, the sum of weights is 21,574.09.
2. Identify the *Modeling Population* in each data year.

[4] This combination assumes that the ENERGY STAR population is the same for 1999 and 2003 (i.e. the same number of supermarkets in the country are larger than 5,000 square foot, open 30 hours per week, etc). If these populations are assumed to be the same, then the combined weights can be based on the sample size of each survey. In a simplified scenario:
New Weight 1999 observation = actual weight * (Sample size 1999) / (sum of sample sizes 1999 and 2003)
New Weight 2003 observation = actual weight * (Sample size 2003) / (sum of sample sizes 1999 and 2003)
This adjustment formula is given in the textbook *Analysis of Health Surveys.* Edward Korn and Barry Graubard. Wiley, 1999, Section 8.1.

a. Identify the number of observations in each data year. For the 1999 survey year, the total number of observation is 49.
b. Sum the weights across this population for each data year. For the 1999 survey, the sum of weights is 14,353.60.

3. Assign each observation with an interim weight. This weight adjusts the CBECS weight of each observation upward so that the sum of the interim weights across the *Modeling Population* equals the sum of weights across of the *ENERGY STAR Population*.
   a. For each year, multiply the weight of each observation by the ratio of the sum of weights across the observations in Step 1a to the sum of weights across the observations in Step 2b. For the 1999 data, the interim adjustment is: 21,574.09/14,353.6 = 1.5030438.
   b. After each observation's weight has been multiplied by the interim adjustment factor, the sum of these interim weights across the Modeling Population will equal the original sum of weights across the ENERGY STAR Population. For the 1999 survey year, the sum of the interim weights is 21,574.09.
4. Assign each observation a combined weight. This adjustment is performed based on the number of observations from each year that are included in the Modeling Population. The combination assumes that the two survey years represent the same target population.
   a. For each year, multiply the interim weight (from Step 3) by the ratio of the number of observations in that year to the total number of observations in the analysis. For the 1999 data, the final adjustment is: 49/83 = 0.593416.
5. Combine the two data sets. The modeling populations from each year are combined, to yield a final set of 83 observations. The combined weights (from Step 4) are employed in all calculations performed on this combined set.

Table 2
Summary of Weighting Calculations

	CBECS 1999	CBECS 2003
Step 1a: Sum of CBECS Weights – ENERGY STAR Population	21,574.09	27,273.56
Step 2a: Number of Observations – Modeling Population	49	34
Step 2b: Sum of CBECS Weights – Modeling Population	14,353.6	26,908.1
Step 3a: Interim adjustment factor	1.5030438	1.0135814
Step 4a: Final adjustment Factor	0.593614	0.4096386
Sum of final combined weights to be used in regression	12,736.51	11,172.30

Dependent Variable

The dependent variable in the Grocery Store/Supermarket analysis is source energy use intensity (source EUI). This is equal to the total source energy use of the facility divided by the gross floor area. By setting source EUI as the dependent variable, the regressions analyze the key drivers of source EUI – those factors that explain the variation in the source energy per square foot in a Grocery Store/Supermarket.

Independent Variables

General Overview:
The CBECS data contain numerous building operation questions that EPA identified as potentially important for Grocery Stores/Supermarkets. Based on a review of the available variables in the CBECS data, in accordance with the EPA criteria for inclusion[5], EPA analyzed the following variables[6]:

- SQFT7 / SQFT8
- PCNUM7[7] / PCNUM8 & RGSTRN8
- FDRM7 / FDRM8
- WKHRS7 / WKHRS8
- MONUSE7 / MONUSE8
- NWKER7 / NWKER8
- NFLOOR7 / NFLOOR8
- RFGWIN7 / RFGWIN8
- RFGOPN7 / RFGOPN8
- RFGCLN7 / RFGCLN8
- COPIER7 / COPIER8
- PRINTR7 / PRINTR8
- COOK7 / COOK8
- HDD657 / HDD658
- CDD657 / CDD658
- COOLP7 / COOLP8
- HEATP7 / HEATP8

EPA performed extensive review on all of these operational characteristics. In addition to reviewing each characteristic individually, characteristics were reviewed in combination with each other (e.g., Heating Degree Days * Percent Heated). As part of the analysis, some variables were reformatted to reflect the physical relationships of building components. For example, the number of workers on the main shift is typically evaluated in a density format. The number of workers *per square foot* (not the gross number of workers) is expected to be correlated with the energy use per square foot. In addition, based on analytical results and residual plots, variables were examined using different transformations (such as the natural logarithm). The analysis consisted of multiple regression formulations. These analyses were structured to find the combination of statistically significant operating characteristics that explained the greatest amount of variance in the dependent variable: source EUI.

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[5] For a complete explanation of these criteria, refer to *Energy Performance Ratings – Technical Methodology* (http://www.energystar.gov/ia/business/evaluate_performance/General_Overview_tech_methodology.pdf).
[6] Note that the 7 at the end of variables indicates that the 1999 CBECS survey is the seventh survey conducted by the Energy Information Administration and the 8 at the end of variables indicates that the 2003 CBECS survey is the eighth survey conducted by the Energy Information Administration.
[7] Note that in the 1999 Survey, PCNUM7 indicates the number of personal computers and registers. In the 2003 survey this is divided into to variables: PCNUM8 and RGSTRN8.

Based on the Grocery Store/Supermarket regression analysis, the following seven characteristics were identified as key explanatory variables that can be used to estimate the expected average source EUI (kBtu/ft^2) in a Grocery Store/Supermarket:

- Natural log of gross square foot
- Natural log of workers per 1,000 square feet
- Natural log of weekly operating hours
- Number of walk in refrigeration units per 1,000 square feet
- Presence of cooking (density)[8]
- Heating degree days times percent heated
- Cooling degree days times percent cooled

Model Testing:
Finally, once the final regression model was developed EPA performed a variety of test runs using existing Grocery Store/Supermarket buildings that had been entered in Portfolio Manager. This existing data provided another set of buildings to examine in addition to the CBECS data, to see the average ratings and distributions, and to assess the impacts and adjustments. This analysis provided a second level of confirmation that the final regression model produces robust results that are unbiased with respect to the key operational characteristics such as building size, worker density, density of walk-in refrigeration and heating and cooling degree days.

It is important to reiterate that the final regression model is based on the nationally representative CBECS data, not data previously entered into EPA's Portfolio Manager.

Regression Modeling Results
The final regression is a weighted ordinary least squares regression across the filtered data set of 83 observations. The dependent variable is source EUI. Each independent variable is centered relative to the mean value, presented in **Table 3**. The final model is presented in **Table 4**. All model variables are significant at the 95% confidence level or better, as shown by the p-levels, with the exception of operating hours per week and cooking density (a p-level below 0.05 indicates 95% confidence). The operating hours and the cooking density coefficients have slightly lower levels significance (approximately 84%). However, given the physical relationship between these characteristics and energy consumption, this result was considered acceptable within the model framework.

The model has an R^2 value of 0.514, indicating that this model explains 51.4% of the variance in source EUI for Grocery Store/Supermarket buildings. Because the final model is structured with energy per square foot as the dependent variable, the explanatory power of square foot is not included in this value. Thus, this value appears artificially low. Re-computing the R^2 in

[8] COOK7 and COOK8 are yes/no variables, which are coded yes if the Grocery Store/Supermarket uses energy for commercial or institutional cooking or food services. If the building has responded "yes" then this variable is included in a density format (1 * 1000 / Square Foot). This density format makes the contribution of cooking more compatible with the use of EUI as an independent variable.

units of source energy[9] demonstrates that the model actually explains 81% of the variation of source energy in supermarkets. This is an excellent result for a statistically based energy model.

Detailed information on the ordinary least squares regression approach, the methodology for performing weather adjustments, and the independent variable centering technique are available in the technical document: *Energy Performance Ratings – Technical Methodology*.

Table 3
Descriptive Statistics for Variables in Final Regression Model

Variable	Full Name	Mean	Minimum	Maximum
SourceEUI	Total Source Energy Use	581.1	135.2	1469
LNWkrDen	Natural Log of Number of Workers per 1,000 ft^2	-0.1084	-1.299	1.306
LNWkhrs	Natural Log of Weekly Operating Hours	4.657	3.871	5.124
LNSqFt	Natural Log of Total Square Feet	9.679	8.517	11.92
WalkinDen	Number of Walk-In Refrigerators per 1,000 ft^2	0.2345	0	0.6
CookDen	Cooking Density	0.0254	0	0.125
HDDxPH	Heating Degree Days x Percent Heated	3510	0	10121
CDDxPC	Cooling Degree Days x Percent Cooled	1219	0	4143

Note:
- *Statistics are computed over the filtered data set (n=83 observations)*
- *Values are weighted by the combined weights, see the Data Filter Section*
- *The mean values are used to center variables for the regression*
- *Cooking Density is zero if the building does not have cooking facilities. It is 1,000 divided by total square foot if the building does have cooking facilities.*

[9] 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 (Actual Source $Energy_i$ – Predicted Source $Energy_i)^2$ across all observations. The Total variation of Y is the sum of (Actual Source $Energy_i$ – Mean Source $Energy)^2$ across all observations.

Table 4 Final Regression Modeling Results				
Dependent Variable		Source Energy		
Number of Observations in Analysis		83		
Model R^2 value		0.5136		
Model F Statistic		11.31		
Model Significance (p-level)		0.000		
	Unstandardized Coefficients	**Standard Error**	**T value**	**Significance (p-level)**
(Constant)	581.1	19.83	29.31	.0000
C_LNWkrDen	115.6	37.77	3.061	.0031
C_LNWkhrs	125.8	79.72	1.578	.1187
C_LNSqFt	84.97	29.04	2.926	.0045
C_WalkinDen	794.4	167.1	4.755	.0000
C_COOKDen	902.8	647.6	1.394	.1674
C_HDDxPH	.0326	.0119	2.739	.0077
C_CDDxPC	.0947	.0313	3.028	.0034

Note:
- *Values are weighted by the combined weights, see Data Filter Section*
- *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* ***Table 3.***
- *Full variable names and definitions are presented in* ***Table 3.***

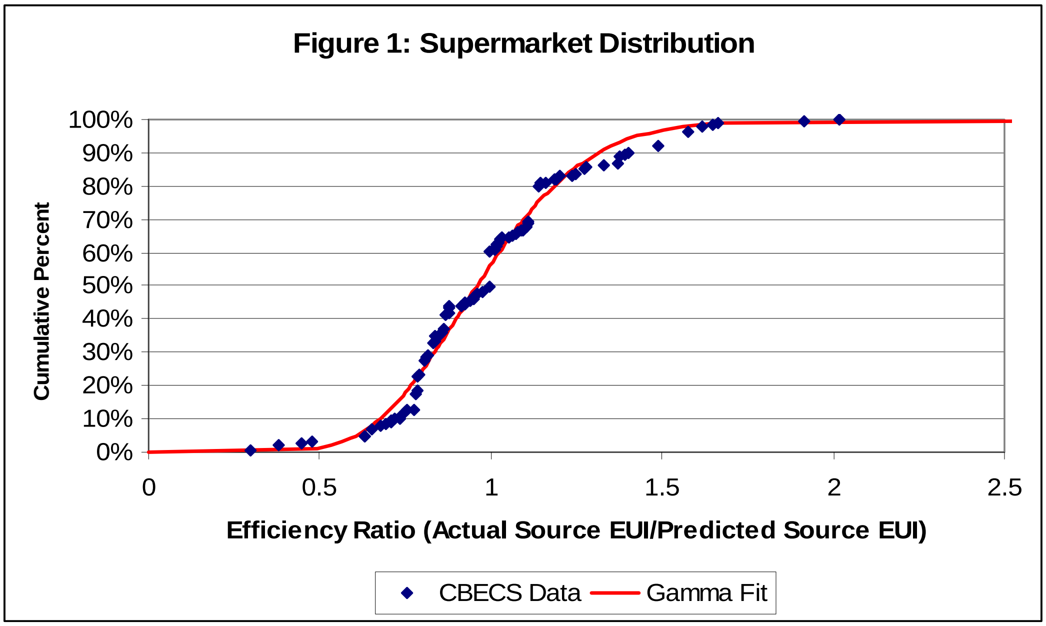
Grocery Store/Supermarket Lookup Table

The final regression model (presented in **Table 4**) yields a prediction of source EUI based on a building's operating constraints. Some buildings in the CBECS data sample use more energy than predicted by the regression equation, while others use less. The *actual* source EUI of each CBECS observation is divided by its *predicted* source EUI to calculate an energy efficiency ratio:

Energy Efficiency Ratio = 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 combined weights (see Data Filters Section). **Figure 1** presents a plot of this cumulative distribution. A smooth curve (shown in red) 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 15.23 and a scale parameter (beta) of 0.0644. For this fit, the sum of squared error is 0.1008.



The final gamma shape and scale parameters are then 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 rating 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 rating of 75; only 25% of the population has ratios this small or smaller. The complete lookup table is presented at the end of the document. In order to read this lookup table, note that if the ratio is less than 0.4919 the rating for that building should be 100. If the ratio is greater than or equal to 0.4919 and less than 0.5359 the rating for the building should be 99, etc.

Example Calculation

As detailed in the document *Energy Performance Ratings – Technical Methodology*, there are five steps to compute a rating. The following is a specific example with the Grocery Store/Supermarket model:

<u>Step 1 – User enters building data into Portfolio Manager</u>

For the purposes of this example, sample data is provided

- Energy data
  - Total annual electricity = 2,700,000 kWh
  - Total annual natural gas = 20,000 therms
  - Note that this data is actually entered in monthly meter entries
- Operational data
  - Gross floor area (ft^2) = 42,000
  - Weekly operating hours = 168
  - Workers on main shift[10] = 20

[10] This represents typical peak staffing level during the main shift. For example, in a supermarket if there are two daily 8 hour shifts of 15 workers each, the Workers on Main Shift value is 15.

- Percent heated = 100%
- Percent cooled = 100%
- Cooking = 1 (yes)
- Walk-in refrigeration units = 10
- HDD (provided by Portfolio Manager, based on zip code) = 1450
- CDD (provided by Portfolio Manager, based on zip code) = 3250

Step 2 – Portfolio Manager computes the Actual Source Energy Use Intensity

In order to compute actual source EUI, Portfolio Manager must convert each fuel from the specified units (e.g. kWh) into Site kBtu, and must convert from Site kBtu to Source kBtu.

- Convert the meter data entries into Site kBtu
  - Electricity: (2,700,000kWh)*(3.412kBtu/kWh) = 9,212,400 kBtu Site
  - Natural gas: (20,000 therms)*(100kBtu/therm) = 2,000,000 kBtu Site
- Apply the source-site ratios to compute the source energy
  - Electricity:
    9,212,400 Site kBtu*(3.34 Source kBtu/Site kBtu) = 30,769,416 kBtu Source
  - Natural Gas:
    2,000,000 Site kBtu *(1.047 Source kBtu/Site kBtu) = 2,094,000 kBtu Source
- Combine source kBtu across all fuels
  - 30,769,416 kBtu + 2,094,000 kBtu = 32,863,416 kBtu
- Divide total source energy by gross floor area
  - Source EUI = 32,863,416 kBtu/42,000ft^2 = 782.5 kBtu/ft^2

Step 3 – Portfolio Manager computes the Predicted Source Energy Intensity

Portfolio Manager uses the building data entered under Step 1 to compute centered values for each operating parameter. These centered values are entered into the Grocery Store/Supermarket regression equation to obtain a predicted source EUI.

- Calculate centered variables
  - Use the operating characteristic values to compute each variable in the model. (e.g. LN(Square Foot) = LN(42,000) = 10.65) .
  - Subtract the reference centering value from calculated variable
    (e.g. LN(Square Foot) - 9.679 = 10.65 - 9.679 = 0.9710).
  - These calculations are summarized in **Table 5**
- Compute predicted source energy use intensity
  - Multiply each centered variable by the corresponding coefficient in the model (e.g. Coefficient*CenteredLN(Square Foot) = 84.97*0.9710=82.51)
  - Take the sum of these products (i.e. coefficient*CenteredVariable) and add to the constant (this yields a predicted source EUI of 775.7 kBtu/ft^2)
  - This calculation is summarized in **Table 6**

Step 4 – Portfolio Manager computes the energy efficiency ratio

The energy efficiency ratio is equal to: Actual Source EUI/ Predicted Source EUI

- Ratio = 782.5/775.7 = 1.009

Step 5 – Portfolio Manager looks up the efficiency ratio in the lookup table

Starting at 100 and working down, Portfolio Manager searches the lookup table for the first ratio value that is larger than the computed ratio for the building.

- A ratio of 1.009 is less than 1.0104 (requirement for 43) but greater than 1.0039 (requirement for 44)
- ***The rating is 43***

Table 5 Example Calculation – Computing Building Centered Variables				
Operating Characteristic	Formula to Compute Variable	Building Variable Value	Reference Centering Value	Building Centered Variable (Variable Value - Center Value)
LNWkrDen	LN(#Workers/ft^2*1000)	-0.7419	-0.1084	-0.6335
LNWkhrs	LN(Weekly Operating Hours)	5.124	4.657	0.4670
LNSqFt	LN(Square Foot)	10.65	9.679	0.9710
WalkinDen	(Walk-in/ft^2*1000)	0.2381	0.2345	0.0036
COOKDen	(Cook/ft^2*1000)	.0238	0.0254	-0.0016
HDDxPH	HDD * PH	1450	3510	-2060
CDDxPC	CDD * PC	3250	1219	2031
Note - *Densities are always expressed as the number per 1,000 square feet* - *The center reference values are the weighted mean values from the CBECS population, show in **Table 3***				

Table 6 Example Calculation – Computing predicted Source EUI			
Operating Characteristic	Centered Variable	Coefficient	Coefficient * Centered Variable
Constant (intercept)	NA	581.1	581.1
LNWkrDen	-0.6335	115.6	-73.23
LNWkhrs	0.4670	125.8	58.75
LNSqFt	0.9710	84.97	82.51
WalkinDen	0.0036	794.4	2.860
COOKDen	-0.0016	902.8	-1.444
HDDxPH	-2060	0.0326	-67.16
CDDxPC	2031	0.0947	192.3
		Predicted Source EUI (kBtu/ft^2)	***775.7***

Attachment

Table 7 lists the energy efficiency ratio cut-off point for each rating, from 1 to 100.

Table 7
Lookup Table for Supermarket Rating

Rating	Cumulative Percent	Energy Efficiency Ratio		Rating	Cumulative Percent	Energy Efficiency Ratio	
		> =	<			>=	<
100	0%	0	0.4919	50	50%	0.9594	0.9657
99	1%	0.4919	0.5359	49	51%	0.9657	0.9719
98	2%	0.5359	0.5653	48	52%	0.9719	0.9782
97	3%	0.5653	0.5881	47	53%	0.9782	0.9846
96	4%	0.5881	0.6071	46	54%	0.9846	0.9909
95	5%	0.6071	0.6236	45	55%	0.9909	0.9974
94	6%	0.6236	0.6384	44	56%	0.9974	1.0039
93	7%	0.6384	0.6518	43	57%	1.0039	1.0104
92	8%	0.6518	0.6641	42	58%	1.0104	1.0170
91	9%	0.6641	0.6756	41	59%	1.0170	1.0237
90	10%	0.6756	0.6865	40	60%	1.0237	1.0304
89	11%	0.6865	0.6967	39	61%	1.0304	1.0372
88	12%	0.6967	0.7065	38	62%	1.0372	1.0441
87	13%	0.7065	0.7158	37	63%	1.0441	1.0511
86	14%	0.7158	0.7248	36	64%	1.0511	1.0582
85	15%	0.7248	0.7334	35	65%	1.0582	1.0654
84	16%	0.7334	0.7418	34	66%	1.0654	1.0728
83	17%	0.7418	0.7499	33	67%	1.0728	1.0802
82	18%	0.7499	0.7578	32	68%	1.0802	1.0878
81	19%	0.7578	0.7655	31	69%	1.0878	1.0955
80	20%	0.7655	0.7730	30	70%	1.0955	1.1034
79	21%	0.7730	0.7804	29	71%	1.1034	1.1114
78	22%	0.7804	0.7876	28	72%	1.1114	1.1196
77	23%	0.7876	0.7947	27	73%	1.1196	1.1280
76	24%	0.7947	0.8017	26	74%	1.1280	1.1367
75	25%	0.8017	0.8086	25	75%	1.1367	1.1455
74	26%	0.8086	0.8153	24	76%	1.1455	1.1546
73	27%	0.8153	0.8220	23	77%	1.1546	1.1640
72	28%	0.8220	0.8286	22	78%	1.1640	1.1737
71	29%	0.8286	0.8351	21	79%	1.1737	1.1837
70	30%	0.8351	0.8416	20	80%	1.1837	1.1941
69	31%	0.8416	0.8480	19	81%	1.1941	1.2048
68	32%	0.8480	0.8544	18	82%	1.2048	1.2161
67	33%	0.8544	0.8607	17	83%	1.2161	1.2278
66	34%	0.8607	0.8670	16	84%	1.2278	1.2401
65	35%	0.8670	0.8732	15	85%	1.2401	1.2530
64	36%	0.8732	0.8794	14	86%	1.2530	1.2667
63	37%	0.8794	0.8856	13	87%	1.2667	1.2813
62	38%	0.8856	0.8918	12	88%	1.2813	1.2968
61	39%	0.8918	0.8979	11	89%	1.2968	1.3135
60	40%	0.8979	0.9041	10	90%	1.3135	1.3317
59	41%	0.9041	0.9102	9	91%	1.3317	1.3516
58	42%	0.9102	0.9163	8	92%	1.3516	1.3737
57	43%	0.9163	0.9225	7	93%	1.3737	1.3986
56	44%	0.9225	0.9286	6	94%	1.3986	1.4275
55	45%	0.9286	0.9347	5	95%	1.4275	1.4618
54	46%	0.9347	0.9409	4	96%	1.4618	1.5048
53	47%	0.9409	0.9470	3	97%	1.5048	1.5631
52	48%	0.9470	0.9532	2	98%	1.5631	1.6580
51	49%	0.9532	0.9594	1	99%	1.6580	>1.6580