ENERGY STAR® Performance Ratings
Technical Methodology for Warehouse

This document presents specific details on the EPA's analytical result and rating methodology for Warehouse. 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: August 2009
Original Release Date: January 2004

Portfolio Manager Definition

Warehouse applies to unrefrigerated or refrigerated buildings that are used to store goods, manufactured products, merchandise or raw materials. The total gross floor area of Refrigerated Warehouses should include all temperature controlled areas designed to store perishable goods or merchandise under refrigeration at temperatures below 50 degrees Fahrenheit. The total gross floor area of Unrefrigerated Warehouses should include space designed to store non-perishable goods and merchandise. Unrefrigerated warehouses also include distribution centers. The total gross floor area of refrigerated and unrefrigerated warehouses should include all supporting functions such as offices, lobbies, stairways, rest rooms, equipment storage areas, elevator shafts, etc. Existing atriums or areas with high ceilings should only include the base floor area that they occupy. The total gross floor area of refrigerated or unrefrigerated warehouse should not include outside loading bays or docks. Self-storage facilities, or facilities that rent individual storage units, are not eligible for a rating using the warehouse model.

Reference Data

The Warehouse regression model is based on data from the Department of Energy, Energy Information Administration's 2003 Commercial Building Energy Consumption Survey (CBECS). Detailed information on this survey, including complete data files, is publicly available at: http://www.eia.doe.gov/emeu/cbecs/contents.html.

Data Filters

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

[1] Periodic updates to the model occur to reflect the most current available market data. The original model was developed using the CBECS 1999 database. The most current update of August 2009 reflects the CBECS 2003 database.

of the Warehouse 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 277 observations.

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 PRAMT8, 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 PRAMT8 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 Warehouse Model Filters		
Condition for Including an Observation in the Analysis	**Rationale**	**Number Remaining**
PBAPLUS8 = 9, 10 or 20	Building Type Filter – CBECS defines building types according to the variable "PBAPLUS." Distribution/Shipping centers are coded as PBAPLUS=9, Non-Refrigerated Warehouses are coded as PBAPLUS=10 and Refrigerated Warehouses are coded as PBAPLUS = 20.	409
Must have energy consumption data	EPA Program Filter – Baseline condition for being a full time Warehouse.	395
Must operate for at least 30 hours per week	EPA Program Filter – Baseline condition for being a full time Warehouse.	367
Must operate for at least 10 months per year	EPA Program Filter – Baseline condition for being a full time Warehouse.	347
A single activity must characterize greater than 50% of the floor space[2]	EPA Program Filter – In order to be considered part of the Warehouse peer group, more than 50% of the building must be Warehouse.	337
If propane is used, the amount category (PRAMTC8) must equal 1, 2, or 3	Data Limitation Filter – Cannot estimate propane use if it is "greater than 1000" or unknown.	321
If propane is used, the maximum estimated propane amount must be 10% or less of the total source energy	Data Limitation Filter – Estimation of propane cannot introduce too much error into the energy use value.	315
Must have square foot less than or equal to 1,000,000	Data Limitation Filter – CBECS masks actual values above 1,000,000 using regional averages.	311
Must not use chilled water	Data Limitation Filter – CBECS does not collect quantities of chilled water.	310
Must have square foot greater than or equal to 5,000	Analytical Filter – Analysis could not model behavior for buildings smaller than 5,000 ft^2.	280
Must have walk-in refrigeration density less than 0.333	Analytical Filter – Values determined to be statistical outliers.	277

Dependent Variable

The dependent variable in the Warehouse 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 source energy per square foot in a Warehouse facility.

[2] This filter is applied by a set of screens. If the variable ONEACT8=1, then one activity occupies 75% or more of the building. If the variable ONEACT8=2, then the activities in the building are defined by ACT18, ACT28, and ACT38. One of these activities must be coded as warehouse/storage (PBAX=13), with a corresponding percent (ACT1PCT8, ACT2PCT8, ACT3PCT8) that is greater than 50.

Independent Variables

General Overview:
The CBECS data contain numerous building operation questions that EPA identified as potentially important for Warehouse facilities. Based on a review of the available variables in the CBECS data, in accordance with the EPA criteria for inclusion[3], EPA analyzed the following variables[4]:

- PBAPLUS8 – More Specific Building Activity
- SQFT8 – Square footage
- WKHRS8 – Weekly hours of operation
- NWKER8 – Number of employees during main shift
- PCNUM8 – Number of computers
- SRVNUM8 – Number of servers
- PRNTRN8 – Number of printers
- COPRN8 – Number of photocopiers
- RFGWIN8 – Number of walk-in refrigeration units
- RFGOPN8 – Number of open refrigerated cases
- RFGRSN8 – Number of residential refrigerators
- RFGCLN8 – Number of closed refrigerated cases
- RFGVNN8 – Number of vending machines
- COOK8 – Energy used for cooking (yes/no)
- FDRM8 – Commercial food preparation area (yes/no)
- CAF8 – Cafeteria or large restaurant (yes/no)
- ELEVTR8 – Elevators (yes/no)
- NELVTR8 – Number of elevators
- NFLOOR8 – Number of floors
- MONUSE8 – Months of year in use
- MANU8 – Energy used for manufacturing (yes/no)
- HLST50 – Part of building heated to less than 50°F (yes/no)
- HEATP8 – Percent heated
- COOLP8 – Percent cooled
- HDD658 - Heating degree days (base 65)
- CDD658 - Cooling degree days (base 65)

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 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

[3] 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).
[4] Note that the 8 at the end of all variables indicates that the 2003 CBECS survey is the eighth survey conducted by the Energy Information Administration.

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.

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

- Natural log of total square footage
- Workers per 1,000 square feet
- Weekly operating hours

In addition, analysis revealed that unrefrigerated and refrigerated warehouses have different responses to weather variables and the presence of walk-in refrigeration units. Due to this behavior, the final regression also includes the following terms that interact with the warehouse type:

Additional Variables for Refrigerated Warehouses
- Refrigerated warehouse (yes/no)
- Cooling degree days

Additional Variables for Unrefrigerated Warehouses
- Heating degree days time Percent heated
- Cooling degree days times Percent cooled
- Walk-in refrigerators per 1,000 square feet

The inclusion of these terms was based on a substantial analysis of the data and the differences among types of warehouses. EPA investigated a wide variety of regression formulations. The terms described above were determined to be statistically significant when added to the Warehouse regression model, improved the overall significance of the Warehouse regression model, and resulted in the most equitable energy performance ratings for both unrefrigerated and refrigerated warehouses. When these unique adjustments are incorporated, both populations exhibited a good distribution of ratings, and there was no evidence of bias with respect to key operational parameters such as weather or number of workers.

Additional analysis was performed to look specifically at unrefrigerated warehouses to determine whether distribution centers performed differently than other unrefrigerated warehouse facilities. This analysis was possible because the CBECS 2003 survey divided Distribution Centers into a unique category, whereas these facilities did not have a separate category in the CBECS 1999 Survey. Facilities identified in the Distribution Center category tended to be larger facilities with more workers. Thus, there are some operational differences. The variables in the updated model do account for some operational differences (e.g. size, number of workers) at distribution centers, but the analysis confirms that the single model performs a fair comparison for both unrefrigerated warehouses and distribution centers.

Another new category in the CBECS 2003 survey identified Self Storage facilities. EPA included these facilities in the analysis, and performed an extensive review of their behavior. However EPA determined that their energy consumption patterns and values for key operating characteristics were notably different from all other types of warehouses. Therefore, Self-Storage facilities are not included in the final regression model and are unable to receive EPA energy performance ratings using the updated Warehouse model.

Model Testing:
Once the final regression model was developed, EPA performed a variety of test runs using existing Warehouse buildings that have been entered into Portfolio Manager. This existing data provided another set of buildings to examine in addition to the CBECS data, to determine 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 key operational characteristics such as building size, worker density, operating hours, 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 277 observations. The dependent variable is source EUI. Each independent variable is centered relative to the mean value, presented in **Table 2**. The final model is presented in **Table 3**. All model variables are significant at the 90% confidence level or better, as shown by the significance levels (a p-level of less than 0.10 indicates 90% confidence). The model has an R^2 value of 0.3952, indicating that this model explains 39.52% of the variance in source EUI for Warehouse 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 the R^2 value, thus this value appears artificially low. Re-computing the R^2 value in units of source energy[5], demonstrates that the model actually explains 70.03% of the variation of source energy in Warehouse facilities. This is a strong 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 is available in the technical document: *Energy Performance Ratings – Technical Methodology*.

[5] 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.

Table 2 Descriptive Statistics for Variables in Final Regression Model				
Variable	**Full Name**	**Mean**	**Minimum**	**Maximum**
SrcEUI	Source Energy per Square Foot	85.12	0.9432	1023
Rfg	Refrigerated Warehouse (yes/no)	0.0222	0.0000	1.000
UnRfg	Unrefrigerated Warehouse (yes/no)	NA	NA	NA
LNSqFt	Natural Log of Square Foot	9.806	8.517	13.59
WkrDen	Number of Workers per 1000 ft^2	0.5943	0.0000	3.909
WkHrs	Weekly operating hours	60.93	30.00	168.0
HDDxPH	Heating Degree Days x Percent Heated	2707	0.0000	9944
CDDxPC	Cooling Degree Days x Percent Cooled	378.7	0.0000	5467
WalkinDen	Number of Walk-in Refrigerators per 1000 ft^2	0.0096	0.0000	0.2439
CDD	Cooling Degree Days	1570	233	5467

Note:

- *Statistics are computed over the filtered data set (n=277 observations).*
- *Values are weighted by the CBECS variable ADJWT8.*
- *The mean values are used to center variables for the regression.*
- *UnRfg is the reverse of Rfg, and is not a separate variable in the model.*

Table 3 Final Regression Modeling Results				
Dependent Variable		Source Energy Intensity (kBtu/ft^2)		
Number of Observations in Analysis		277		
Model R^2 value		0.3952		
Model F Statistic		21.89		
Model Significance (p-level)		0.0000		
	Unstandardized Coefficients	**Standard Error**	**T value**	**Significance (p-level)**
(Constant)	82.18	4.047	20.31	0.0000
Rfg	168.6	33.42	5.046	0.0000
C_LNSqFt	13.63	4.520	3.015	0.0028
C_WkrDen	41.84	7.042	5.941	0.0000
C_WkHrs	0.3111	0.1472	2.113	0.0355
UnRfg x C_HDDxPH	0.0110	0.0017	6.677	0.0000
UnRfg x C_CDDxPC	0.0205	0.0073	2.787	0.0057
UnRfg x C_WalkinDen	262.3	110.2	2.379	0.0180
Rfg x C_CDD	0.0708	0.0400	1.769	0.0780

Note:

- *The regression is a weighted ordinary least squares regression, weighted by the CBECS variable "ADJWT8".*
- *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 2****.*
- *Full variable names and definitions are presented in* ***Table 2.***
- *The Rfg and UnRfg terms are not centered because they represent a multiplier on the already centered variables C_HDDxPH, C_CDDxPC, C_WalkinDen, and C_CDD.*

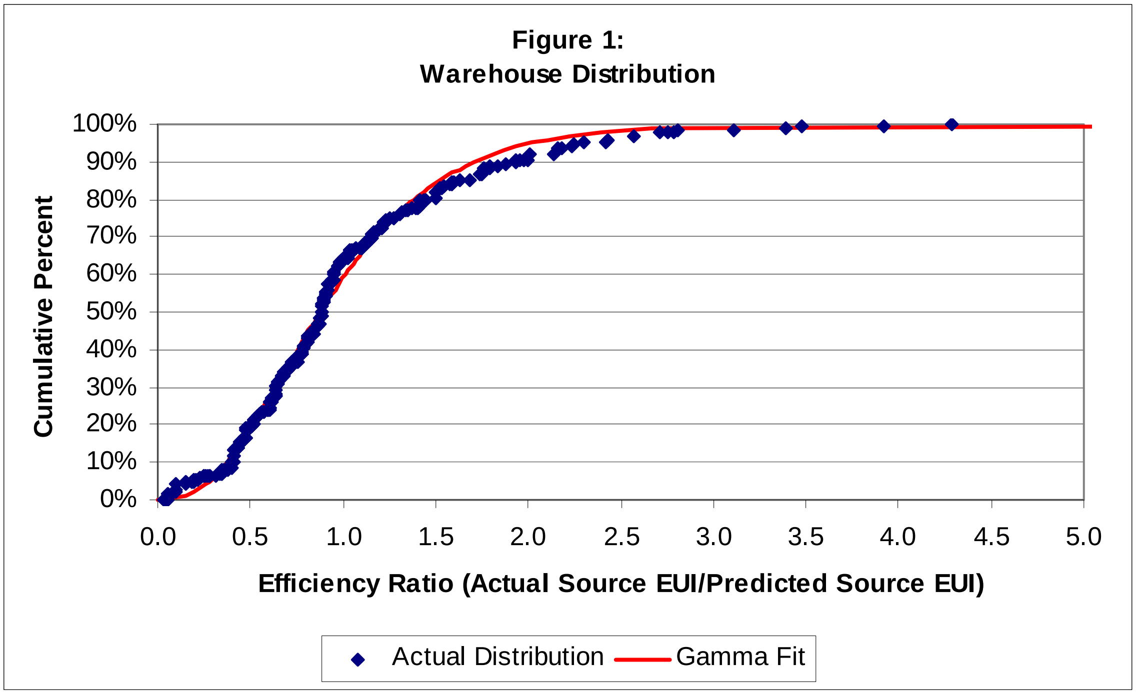
Warehouse Lookup Table

The final regression model (presented in **Table 3**) 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 individual observation weights from the CBECS dataset. **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 3.1840 and a scale parameter (beta) of 0.3066. For this fit, the sum of the squared error is 0.1578.



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 0.1536 the rating for that building should be 100. If the ratio is greater than or equal to 0.1536 and less than 0.1974 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 Warehouse model:

Step 1 – User enters building data into Portfolio Manager

For the purposes of this example, sample data is provided.

- Energy data
  - Total annual electricity = 850,000 kWh
  - Total annual natural gas = 35,000 therms
  - Note that this data is actually entered in monthly meter entries
- Operational data
  - Gross floor area (ft^2) = 125,000
  - Number of Workers = 90
  - Operating Hours = 60

- Refrigerated Warehouse = No
- Number of Walk-In Refrigeration Units = 0
- Percent heated = 100
- Percent Cooled = 20
- HDD (provided by Portfolio Manager, based on zip code) = 5806
- CDD (provided by Portfolio Manager, based on zip code) = 1343

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: (850,000 kWh)*(3.412kBtu/kWh) = 2,900,200 kBtu Site
  - Natural gas: (35,000 therms)*(100kBtu/therm) = 3,500,000 kBtu Site
- Apply the source-site ratios to compute the source energy
  - Electricity:
    2,900,200 Site kBtu*(3.34 Source kBtu/Site kBtu) = 9,686,668 kBtu Source
  - Natural Gas:
    3,500,000 Site kBtu *(1.047 Source kBtu/Site kBtu) = 3,664,500 kBtu Source
- Combine source kBtu across all fuels
  - 9,686,668 kBtu + 3,664,500 kBtu = 13,351,168 kBtu
- Divide total source energy by gross floor area
  - Source EUI = 13,351,168 kBtu/125,000 ft^2 = 106.8 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 Warehouse 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. WkrDen = 90 / 125,000 * 1000 = 0.7200)
  - Subtract the reference centering value from calculated variable
    (e.g. WkrDen – 0.5943 = 0.7200 – 0.5943 = 0.1257).
  - These calculations are summarized in **Table 4**
- Compute predicted source energy use intensity
  - Multiply each centered variable by the corresponding coefficient in the model (e.g. Coefficient*CenteredWkrDen = 41.84*0.1257 = 5.259)
  - Take the sum of these products (i.e. coefficient*CenteredVariable) and add to the constant (this yields a predicted Source EUI of 142.8 kBtu/ft^2)
  - This calculation is summarized in **Table 5**

Step 4 – Portfolio Manager computes the energy efficiency ratio

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

- Ratio = 106.8/142.8 = 0.7479

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 0.7479 is less than 0.7525 (requirement for 61) but greater than 0.7406 (requirement for 62)
- ***The rating is 61***

Table 4
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)
Rfg	Refrigerated Warehouse	0.0000	NA	0.000
UnRfg	Unrefrigerated Warehouse	1.000	NA	NA
C_LNSqFt	Natural Log of SQFT	11.74	9.806	1.934
C_WkrDen	Number of Workers / ft^2*1000	0.7200	0.5943	0.1257
C_WkHrs	Operating Hours	60.00	60.93	-0.9300
C_HDDxPH	HDD*Percent Heated	5806	2707	3099
C_CDDxPC	CDD*Percent Cooled	268.6	378.7	-110.1
C_WalkinDen	#Walk-in Refrigerators/ft^2*1000	0.0000	0.0096	-0.0096
C_CDD	CDD	1343	1570	-227.0
UnRfg x C_HDDxPH	Unrefrigerated Warehouse* C_HDD*PH	3099	NA	3099
UnRfg x C_CDDxPC	Unrefrigerated Warehouse* C_CDD*PC	-110.1	NA	-110.1
UnRfg x C_WalkinDen	Unrefrigerated Warehouse* C_WalkinDen	-0.0096	NA	-0.0096
Rfg x C_CDD	Refrigerated Warehouse*C_CDD	0.0000	NA	0.0000

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 2.*
- *The Rfg and UnRfg terms are not centered because they represent a multiplier on the already centered variables C_HDDxPH, C_CDDxPC, C_WalkinDen, and C_CDD. For example, since this building is an unrefrigerated warehouse, the value for the UnRfg x C_HDDxPH term is 1 times the value of 3099 for the centered term.*

Table 5
Example Calculation – Computing predicted Source EUI

Operating Characteristic	Centered Variable	Coefficient	Coefficient * Centered Variable
Constant	NA	82.18	82.18
Rfg	0.0000	168.6	0.0000
C_LNSqFt	1.934	13.63	26.36
C_WkrDen	0.1257	41.84	5.259
C_WkHrs	-0.9300	0.3111	-0.2893
UnRfg x C_HDDxPH	3099	0.0110	34.09
UnRfg x C_CDDxPC	-110.1	0.0205	-2.257
UnRfg x C_WalkinDen	-0.0096	262.3	-2.518
Rfg x C_CDD	0.0000	0.0708	0.0000
		Predicted Source EUI (kBtu/ft^2)	***142.8***

Attachment

Table 6 lists the energy efficiency ratio cut-off point for each rating, from 1 to 100.

Table 6
Lookup Table for Warehouse Rating

Rating	Cumulative Percent	Energy Efficiency Ratio		Rating	Cumulative Percent	Energy Efficiency Ratio	
		> =	<			> =	<
100	0%	0	0.1536	50	50%	0.8761	0.8891
99	1%	0.1536	0.1974	49	51%	0.8891	0.9021
98	2%	0.1974	0.2297	48	52%	0.9021	0.9153
97	3%	0.2297	0.2566	47	53%	0.9153	0.9287
96	4%	0.2566	0.28	46	54%	0.9287	0.9422
95	5%	0.28	0.3013	45	55%	0.9422	0.9559
94	6%	0.3013	0.3208	44	56%	0.9559	0.9698
93	7%	0.3208	0.3391	43	57%	0.9698	0.9839
92	8%	0.3391	0.3564	42	58%	0.9839	0.9982
91	9%	0.3564	0.3728	41	59%	0.9982	1.0127
90	10%	0.3728	0.3886	40	60%	1.0127	1.0275
89	11%	0.3886	0.4038	39	61%	1.0275	1.0425
88	12%	0.4038	0.4186	38	62%	1.0425	1.0577
87	13%	0.4186	0.4329	37	63%	1.0577	1.0733
86	14%	0.4329	0.4468	36	64%	1.0733	1.0892
85	15%	0.4468	0.4605	35	65%	1.0892	1.1054
84	16%	0.4605	0.4739	34	66%	1.1054	1.1219
83	17%	0.4739	0.487	33	67%	1.1219	1.1388
82	18%	0.487	0.4999	32	68%	1.1388	1.1561
81	19%	0.4999	0.5127	31	69%	1.1561	1.1738
80	20%	0.5127	0.5253	30	70%	1.1738	1.1919
79	21%	0.5253	0.5377	29	71%	1.1919	1.2106
78	22%	0.5377	0.5501	28	72%	1.2106	1.2297
77	23%	0.5501	0.5623	27	73%	1.2297	1.2495
76	24%	0.5623	0.5744	26	74%	1.2495	1.2698
75	25%	0.5744	0.5865	25	75%	1.2698	1.2908
74	26%	0.5865	0.5985	24	76%	1.2908	1.3125
73	27%	0.5985	0.6104	23	77%	1.3125	1.335
72	28%	0.6104	0.6223	22	78%	1.335	1.3583
71	29%	0.6223	0.6341	21	79%	1.3583	1.3826
70	30%	0.6341	0.6459	20	80%	1.3826	1.4079
69	31%	0.6459	0.6577	19	81%	1.4079	1.4343
68	32%	0.6577	0.6695	18	82%	1.4343	1.4621
67	33%	0.6695	0.6813	17	83%	1.4621	1.4912
66	34%	0.6813	0.6931	16	84%	1.4912	1.522
65	35%	0.6931	0.705	15	85%	1.522	1.5546
64	36%	0.705	0.7168	14	86%	1.5546	1.5893
63	37%	0.7168	0.7287	13	87%	1.5893	1.6264
62	38%	0.7287	0.7406	12	88%	1.6264	1.6664
61	39%	0.7406	0.7525	11	89%	1.6664	1.7098
60	40%	0.7525	0.7646	10	90%	1.7098	1.7573
59	41%	0.7646	0.7766	9	91%	1.7573	1.8098
58	42%	0.7766	0.7888	8	92%	1.8098	1.8687
57	43%	0.7888	0.801	7	93%	1.8687	1.9358
56	44%	0.801	0.8132	6	94%	1.9358	2.0142
55	45%	0.8132	0.8256	5	95%	2.0142	2.1089
54	46%	0.8256	0.8381	4	96%	2.1089	2.229
53	47%	0.8381	0.8507	3	97%	2.229	2.3951
52	48%	0.8507	0.8633	2	98%	2.3951	2.6721
51	49%	0.8633	0.8761	1	99%	2.6721	>2.6721