ENERGY STAR® Portfolio Manager® Technical Reference

ENERGY STAR Score for Medical Offices in Canada

OVERVIEW

The ENERGY STAR Score for Medical Offices in Canada applies to properties that provide diagnosis and treatment for medical, dental, or psychiatric outpatient care. 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. A statistical analysis of the peer building population is performed to identify the aspects of building activity that are significant drivers of energy use and then to normalize for those factors. The result of this analysis is an equation that predicts 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 medical offices in Canada applies to facility space used to provide diagnosis and treatment for medical, dental, or psychiatric outpatient care. The ENERGY STAR score applies to individual buildings only and is not available for campuses.
- **Reference data.** The analysis for medical offices in Canada is based on data from the Survey on Commercial and Institutional Energy Use (SCIEU), which was commissioned by Natural Resources Canada (NRCan) and carried out by Statistics Canada, and represents the energy consumption year 2009.
- **Adjustments for weather and business activity.** The analysis includes adjustments for:
  - Building size
  - Number of workers on the main shift
  - Hours of operation per week
  - Weather and climate (using heating and cooling degree days, retrieved based on postal code)
  - Percent of the building that is cooled
- **Release date.** This is the first release of the ENERGY STAR score for Medical Offices in Canada.

This document presents details on the development of the 1 – 100 ENERGY STAR score for medical office 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 http://www.energystar.gov/ENERGYSTARScore. The subsequent sections of this document offer specific details on the development of the ENERGY STAR score for medical offices.

REFERENCE DATA & FILTERS

The ENERGY STAR score for medical office properties in Canada applies to properties that are used to provide diagnosis and treatment for medical, dental, or psychiatric outpatient care. The reference data used to establish the peer building population is based on data from the Survey on Commercial and Institutional Energy Use (SCIEU), which was commissioned by Natural Resources Canada and carried out by Statistics Canada in late 2010 and early 2011. The energy data for the survey was from the calendar year 2009. The raw collected data file for this survey is not publically available, but a report providing summary results is available on Natural Resources Canada's website at http://oee.nrcan.gc.ca/publications/statistics/scieu09/scieu_e.pdf.

To analyze the building energy and operating characteristics in this survey data, 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, 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 medical offices and the rationale behind the filter. After all filters are applied, the remaining data set has 117 observations. Due to the confidentiality of the survey data, NRCan is not able to identify the number of cases after each filter.

Figure 1 – Summary of Filters for the ENERGY STAR Score for Medical Offices

Condition for Including an Observation in the Analysis	Rationale
Defined as category 2 in SCIEU – Medical Office Building	The SCIEU survey covered the commercial and institutional sector and included buildings of all types. For this model, only the observations identified as main activity being medical office are used.
Building must be at least 50% medical office	Building Type Filter – In order to be considered part of the medical office peer group, more than 50% of the building must be medical office
Must have electric energy data	Program Filter – Basic requirement to be considered a medical office is that it requires electrical energy. Electricity can be grid-purchased or produced on site.
Must operate at least 10 months per year	Program Filter – Basic requirement to be considered as full time operation.
Must operate at least 30 hours per week	Program Filter – Basic requirement to be considered as full time operation.
Must have at least 1 worker	Program Filter – Basic requirement for a functioning medical office; there must be at least one worker during the main shift.
Must have no inpatient beds	Program Filter – Baseline condition for being an outpatient care facility fitting the definition of a Canadian medical office.
Must not use any "other" fuels for which the energy is not reported	Data Limitation Filter – No data collected on this energy. The survey asked if additional energy consumption occurred in the building that was not reported. In those occurrences, the cases were removed from the analysis.
Must be built in 2008 or earlier	Data Limitation Filter – The survey reported the energy for calendar year 2009. Therefore, if the building was being built in 2009, a full year of energy data would not be available.
Must not include energy supplied to other buildings that was not quantified	Data Limitation Filter – No data collected on this consumption if the respondent identified that the building supplied energy to other buildings but did not provide the amount.

Condition for Including an Observation in the Analysis	Rationale
Must be at least 250 m^2 and less than 20,000 m^2	Analytical Filter – The analysis could not model behavior of buildings smaller than 250 m^2 or larger than 20,000 m^2.
Source EUI must be greater than 0.4 GJ/m^2	Analytical Filter – Values determined to be outliers based on analysis of the data. Outliers are typically clearly outside normal operating parameters for a building of this type.
Must have a worker density (workers per 100 m^2) that is greater than or equal to 0.3 and less than or equal to 7	Analytical Filter – Values determined to be outliers based on analysis of the data. Outliers are typically clearly outside normal operating parameters for a building of this type.
Electricity must constitute more than 10% of the site energy use	Analytical Filter – Values determined to be outliers based on analysis of the data and engineering knowledge of building energy consumption patterns. Outliers are typically clearly outside normal operating parameters for a building of this type.

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 available during the analysis, 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 has a different behaviour from the rest of the properties (e.g. medical offices that are smaller than 250 m^2 do not behave the same way as larger buildings), in which case an Analytical Filter is 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 properties that are situated on a campus. The main unit for benchmarking in Portfolio Manager is the property, which may be used to describe either a single building or a campus of buildings. The applicability of the ENERGY STAR score depends on the type of property. For medical office properties, the score is based on individual buildings, because the primary function of the medical office is contained within a single building and because the properties included in the reference data are single buildings. In cases where multiple medical offices are situated together (e.g. as part of a hospital campus), each individual building can receive its own ENERGY STAR score, but a group of buildings together cannot earn a score.

VARIABLES ANALYZED

To normalize for differences in business activity, we performed 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, was analyzed using a weighted ordinary least squares regression, which evaluated energy use relative to business activity (e.g. number of workers, operating hours per week, area, and climate). This linear regression yielded 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 medical offices in Canada.

Dependent Variable

The dependent variable is what we try to predict with the regression equation. For the medical office 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 regression analyzes the key drivers of source EUI – those factors that explain the variation in source energy use per square meter in medical offices. The unit for source EUI in the Canadian model is the gigajoule per square meter (GJ/m^2) per year.

Independent Variables

The SCIEU data contains numerous building property operation questions that NRCan identified as potentially important for medical offices. Based on a review of the available variables in the SCIEU data, in accordance with the criteria for inclusion,[1] NRCan initially analyzed the following variables in the regression analysis:

- Gross building area (m^2)
- Heating degree days (HDD)
- Cooling degree days (CDD)
- Average outdoor temperature (°C)
- Percentage of floor space that is heated
- Percentage of floor space that is cooled
- Number of workers during the main shift
- Weekly hours of operation
- Months in operation
- Number of computers and computer servers
- Number of floors
- Number of elevators and escalators
- Number of medical diagnosis and treatment machines (see notes below)
- Number representing the hospital bed capacity (see notes below)
- Presence of commercial food preparation area (y/n)
- Floor space that is interior parking
- Floor space that is heated interior parking
- Presence of associated exterior parking (y/n)

NRCan and 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 times 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 can be evaluated in a density format. The number of workers *per square meter* (as opposed to the gross number of workers) could be expected to be correlated with the energy use per square meter. Also, based on analytical results and residual plots, variables were 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 explained the greatest amount of variance in the dependent variable: source EUI.

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

The final regression equation includes the following variables:

- Building floor area
- Number of workers per 100 m^2 during main shift
- Weekly operating hours
- Number of heating degree days (HDD)
- Number of cooling degree days times percent of the building that is cooled (% cooled x CDD)

These variables are used together to compute the predicted source EUI for medical offices. The predicted source EUI is the mean EUI for a hypothetical population of buildings that share the same values for each of these characteristics. That is, the mean energy for buildings that operate like your building.

Climate (HDD and CDD)

The analysis looked at the Heating Degree Days (HDD), Cooling Degree Days (CDD), percent of the building that is heated, and percent of the building that is cooled. There was a strong correlation between the EUI of the building and the HDD observed by the building. This variable is included in the model.

With regards to the CDD variable; the analysis indicated that a noticeable portion of the regression sample observations did not have air conditioning, resulting in lower EUI on average. As a result, multiplying the cooling degree days (CDD) by the percent of the building that is cooled (% cooled) resulted in a variable (% cooled x CDD) that was a consistently significant predictor of source EUI.

The weather data for the Canadian model was taken from the U.S. National Climatic Data Center sources which include 152 Canadian weather stations. These sources are also the sources of weather data for Portfolio Manager. The weather data is associated to the building using the closest Canadian weather station based on the postal code of the building.

Property Floor Area

Several variables that were related to the size of the building were evaluated during the analysis, including the area and the natural logarithm of area. The variable that was consistently significant was area. However, it was also noticed that very small and very large buildings did not behave the same way as the majority of the observations. Small buildings had a very wide range of energy use intensities that were difficult to model with the available predictor variables. For this reason, it was necessary to exclude buildings smaller than 250 m^2 from the analysis in order to establish a consistent statistical model for the remainder of the population. Similarly, as there were very few observations larger than 20,000 m^2 in the sample, it was difficult to establish a statistical model to estimate the source EUI of these large buildings. As a result, buildings larger than 20,000 m^2 were also excluded from the regression analysis. Buildings over this upper area threshold may still receive an ENERGY STAR score, but the predicted source energy adjustment for area is capped at 20,000 m^2. Buildings smaller than 250 m^2 are not eligible to receive an ENERGY STAR score. It is important to note that the actual building size is still used when calculating density variables, such as the number of workers per 100 m^2 and EUI.

Number of Workers

The worker density (workers per 100 m^2) was always highly significant during the development of the medical office model. However, the presence of outliers over a wide range of observed worker densities made it difficult to establish stable statistical models when including very low or very high worker density observations in the regression sample. It was therefore necessary to filter out observations with very low (<0.3 workers/100 m^2) or very high (>7.0 workers/100 m^2) worker densities. Any building seeking an ENERGY STAR score with a worker density below the regression sample lower limit will be attributed a worker density value of 0.3 workers/100 m^2, and any building seeking an ENERGY STAR score with a worker density above the regression sample upper limit will receive a worker density value of 7 workers/100 m^2.

Medical Diagnosis or Treatment Machines

The SCIEU 2009 survey collected data on the presence of various types of medical equipment, including x-ray, CAT scan, dialysis, ultrasound, and MRI machines. As MRI machines are major energy consumers, the presence of these machines in a building could significantly increase EUI. However, the results of the analysis indicated that the number of medical diagnosis and treatment machines (including MRIs) was not a statistically significant predictor of EUI in medical offices. This result suggests that most MRIs are located in hospitals rather than outpatient medical offices.

Testing

Finally, NRCan further analyzed the regression equation using actual data that has been entered in Portfolio Manager. This provided another set of buildings to examine, in addition to the SCIEU data, to see the ENERGY STAR scores and distributions, and to assess the impacts and adjustments. This analysis on a separate data set provided a second level of verification to ensure that there was a good distribution of scores.

It is important to reiterate that the final regression equation is based on a nationally representative reference data from SCIEU 2009, not on 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 117 observations. The dependent variable is source EUI. Each independent variable is centered relative to the weighted mean value, presented in ***Figure 2***. The final equation is presented in ***Figure 3***. All variables in the regression equation are significant at the 90% confidence level or better, as shown by their respective significance levels.

The regression equation has a coefficient of determination (R^2) value of 0.318, indicating that this equation explains 31.8% of the variance in source EUI for medical office buildings. Because the final equation is structured with energy per unit area as the dependent variable, the explanatory power of the area is not included in the R^2 value, and thus this value appears artificially low. Re-computing the R^2 value in units of source energy[2] demonstrates that the equation actually explains 80.6% of the variation in total source energy of medical offices. 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.

[2] 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.

Figure 2 - Descriptive Statistics for Variables in Final Regression Equation

Variable	Median	Minimum	Maximum	Centering term
Source energy per square meter (GJ/m^2)	1.241	0.4139	3.753	1.384
Heating degree days	4,581	3,069	7,323	4,808
Cooling degree days x percent cooled	81.32	0.000	399.7	100.1
Number of workers per $100m^2$ during main shift	2.000	0.3134	6.400	2.466
Weekly operating hours	51	32	168	58.94
Building floor area	892	266	17,963	1,635

Figure 3 - Final Regression Results

Summary				
Dependent variable	Source energy use intensity (GJ/m^2)			
Number of observations in analysis	117			
R^2 value	0.318			
Adjusted R^2 value	0.287			
F statistic	10.34			
Significance (p-level)	< 0.0001			
	Unstandardized Coefficients	**Standard Error**	**T value**	**Significance (p-level)**
Constant	1.384	0.050	27.631	< 0.0001
C_Heating degree days	0.0002015	0.00007	2.926	0.0042
C_Cooling degree days x percent cooled	0.001297	0.00078	1.669	0.0978
C_Number of workers per $100m^2$	0.2428	0.049	5.000	< 0.0001
C_Weekly operating hours	0.007505	0.0026	2.856	0.0051
C_Building floor area in m^2	0.00004511	0.000021	2.115	0.0366

- *Notes:*
- *The regression is a weighted ordinary least squares regression, weighted by the SCIEU variable "WTBS."*
- *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.*
- *The Area variable is limited at a maximum value of 20,000 m^2 for calculation of the predicted EUI.*
- *The Worker Density variable is limited at a minimum of 0.3 workers/100 m^2 and a maximum of 7.0 workers/100 m^2 for the calculation of predicted EUI.*
- *Heating and cooling degree days are sourced from Canadian weather stations included in the U.S. National Climatic Data Center system.*

ENERGY STAR SCORE LOOKUP TABLE

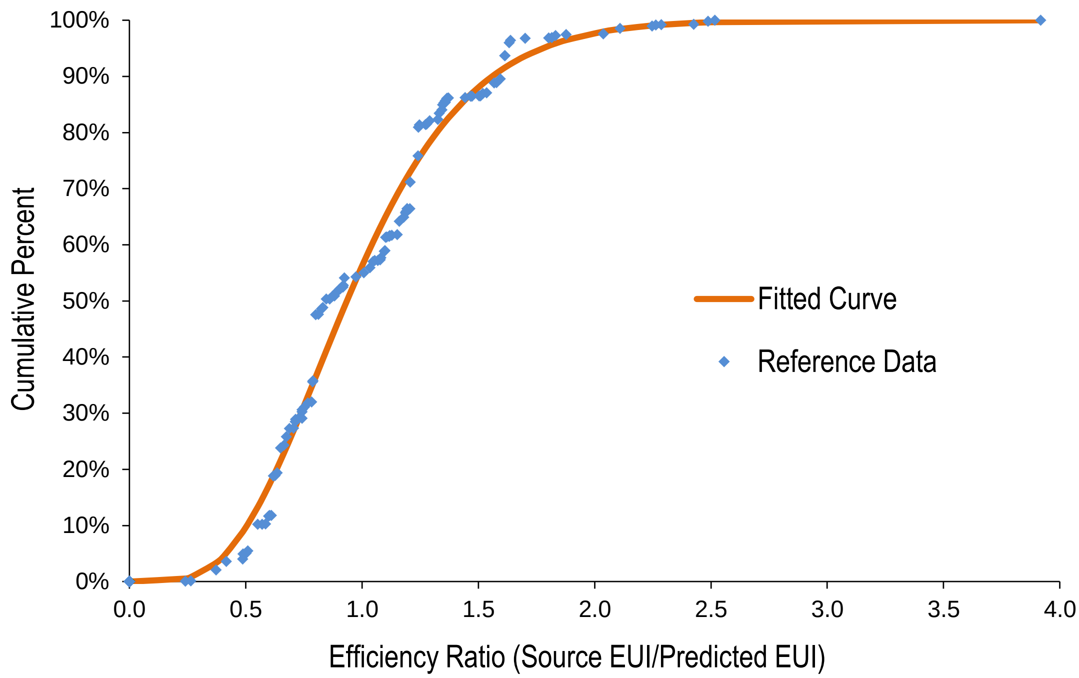
The final regression equation (presented in ***Figure 3***) yields a prediction of source EUI based on a building's operating characteristics. Some buildings in the SCIEU data sample use more energy than predicted by the regression equation, while others use less. The *actual* source EUI of each reference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

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

An efficiency ratio lower than one 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 5.530 and a scale parameter (beta) of 0.180. For this fit, the sum of the squared error is 0.201.

Figure 4 – Distribution for Medical Offices



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% corresponds to the ratio for a score of 75; only 25% of the population has a ratio this small or smaller. The complete score lookup table is presented in ***Figure 5***.

Figure 5 – ENERGY STAR Score Lookup Table for Medical Offices

ENERGY STAR Score	Cumulative Percent	Energy Efficiency Ratio		ENERGY STAR Score	Cumulative Percent	Energy Efficiency Ratio	
		> =	<			>=	<
100	0%	0.0000	0.2771	50	50%	0.9346	0.9449
99	1%	0.2771	0.3273	49	51%	0.9449	0.9552
98	2%	0.3273	0.3624	48	52%	0.9552	0.9657
97	3%	0.3624	0.3906	47	53%	0.9657	0.9762
96	4%	0.3906	0.4146	46	54%	0.9762	0.9868
95	5%	0.4146	0.4359	45	55%	0.9868	0.9975
94	6%	0.4359	0.4551	44	56%	0.9975	1.0084
93	7%	0.4551	0.4729	43	57%	1.0084	1.0194
92	8%	0.4729	0.4895	42	58%	1.0194	1.0305
91	9%	0.4895	0.5051	41	59%	1.0305	1.0418
90	10%	0.5051	0.5200	40	60%	1.0418	1.0532
89	11%	0.5200	0.5341	39	61%	1.0532	1.0648
88	12%	0.5341	0.5477	38	62%	1.0648	1.0766
87	13%	0.5477	0.5609	37	63%	1.0766	1.0885
86	14%	0.5609	0.5736	36	64%	1.0885	1.1007
85	15%	0.5736	0.5859	35	65%	1.1007	1.1131
84	16%	0.5859	0.5979	34	66%	1.1131	1.1257
83	17%	0.5979	0.6097	33	67%	1.1257	1.1385
82	18%	0.6097	0.6212	32	68%	1.1385	1.1517
81	19%	0.6212	0.6324	31	69%	1.1517	1.1651
80	20%	0.6324	0.6435	30	70%	1.1651	1.1788
79	21%	0.6435	0.6544	29	71%	1.1788	1.1929
78	22%	0.6544	0.6651	28	72%	1.1929	1.2073
77	23%	0.6651	0.6757	27	73%	1.2073	1.2221
76	24%	0.6757	0.6861	26	74%	1.2221	1.2373
75	25%	0.6861	0.6965	25	75%	1.2373	1.2530
74	26%	0.6965	0.7067	24	76%	1.2530	1.2692
73	27%	0.7067	0.7169	23	77%	1.2692	1.2859
72	28%	0.7169	0.7269	22	78%	1.2859	1.3032
71	29%	0.7269	0.7370	21	79%	1.3032	1.3212
70	30%	0.7370	0.7469	20	80%	1.3212	1.3398
69	31%	0.7469	0.7568	19	81%	1.3398	1.3593
68	32%	0.7568	0.7667	18	82%	1.3593	1.3797
67	33%	0.7667	0.7765	17	83%	1.3797	1.4010
66	34%	0.7765	0.7863	16	84%	1.4010	1.4234
65	35%	0.7863	0.7961	15	85%	1.4234	1.4472
64	36%	0.7961	0.8059	14	86%	1.4472	1.4724
63	37%	0.8059	0.8156	13	87%	1.4724	1.4992
62	38%	0.8156	0.8254	12	88%	1.4992	1.5281
61	39%	0.8254	0.8352	11	89%	1.5281	1.5592
60	40%	0.8352	0.8450	10	90%	1.5592	1.5932
59	41%	0.8450	0.8548	9	91%	1.5932	1.6307
58	42%	0.8548	0.8646	8	92%	1.6307	1.6725
57	43%	0.8646	0.8745	7	93%	1.6725	1.7201
56	44%	0.8745	0.8844	6	94%	1.7201	1.7753
55	45%	0.8844	0.8943	5	95%	1.7753	1.8417
54	46%	0.8943	0.9043	4	96%	1.8417	1.9253
53	47%	0.9043	0.9144	3	97%	1.9253	2.0402
52	48%	0.9144	0.9245	2	98%	2.0402	2.2299
51	49%	0.9245	0.9346	1	99%	2.2299	> 2.2299

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 Medical Offices.

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	650,000 kWh
Natural gas	75,000 m^3

Property Use Details	Value
Gross floor area (m^2)	5,500
HDD (provided by Portfolio Manager, based on postal code)	4,500
CDD (provided by Portfolio Manager, based on postal code)	350
Percent of the building that is cooled	50%
Workers on main shift[3]	100
Weekly operating hours	80

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 GJ Multiplier	Site GJ	Source Multiplier	Source GJ
Electricity	650,000 kWh	0.0036	2,340	2.05	4,797
Natural gas	75,000 m^3	0.03843	2,882	1.02	2,940
				Total Source Energy (GJ)	7,737
				Source EUI (GJ/m^2)	**1.407**

[3] This represents typical peak staffing level during the main shift. For example, in a medical office, if there are two daily 6-hour shifts of 25 workers each, the Workers on main shift value is 25.

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 density 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 medical office regression equation to obtain a predicted source EUI.

Computing Predicted Source EUI

Variable	Actual Building Value	Reference Centering Value	Building Centered Variable	Coefficient	Coefficient x Centered Variable
Constant	-	-	-	1.384	1.384
Heating degree days	4,500	4,808	-308.00	0.0002015	-0.062
Cooling degree days x percent cooled	175	100.1	74.90	0.001297	0.097
Number of workers per 100 m^2 during main shift *	1.818	2.466	-0.648	0.2428	-0.157
Weekly operating hours	80	58.94	21.06	0.007505	0.158
Building floor area in m^2 **	5,500	1,635	3,865	0.00004511	0.174
				Predicted Source EUI (GJ/m^2)	1.594

**The number of workers per 100 m² value is subject to floor and ceiling values of 0.3 and 7.0 workers/100 m² respectively, as described above.*
*** If the building gross floor area is larger than 20,000 m², then 20,000 m² is used.*

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 = 1.407 / 1.594 = 0.8827

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 0.8827 is less than 0.8844 (requirement for 56) but greater than 0.8745 (requirement for 57).
- ***The ENERGY STAR score is 56.***