

Exercise 1: Benchmarking for Heating

The goal of this exercise is to determine the buildings heating efficiency in terms of BTU/sf/HDD, determine the DHW baseload and identify any outliers. Use this exercise across your portfolio to identify the highest wasting buildings.

On Page 2, you'll find all the energy data you need. On Page 3, complete the worksheet.

For buildings heated with Gas, Oil or Steam

1. Get a year's worth of oil, gas or steam usage.
2. Look for average daily fuel usage in the summer (hot water only)
3. Add summer periods together; divide by number of days during your specific summer period.
4. Multiply by 365. This is your annual base usage.
5. Get annual totals of gas, oil, or steam usage for the year.
6. Subtract your annual base usage from the total annual usage. This is your heating usage*.
7. Divide by building square feet. This is your heating consumption per square foot.
8. Multiply by 100,000 (gas), or 138,000 (#2), or 145,000 (#4), 155,000 (#6) or 1,000,000 (steam). These are the Btu/sq.ft.**
9. Divide by annual heating degree days = Btu/ft²/HDD
10. Divide annual base usage by total usage. This is your percentage of fuel used to make hot water.
11. Get your total annual kwh electricity usage. Divide by building square feet and by number of bedrooms.

**For #6, usage is in therms for gas.*

*** Refer to the table below for conversion factors.*

| Fuel Type | Unit | Equiv. BTU |
|------------------|----------|------------|
| #2 oil | 1 Gallon | 138,000 |
| #4 oil | 1 Gallon | 145,000 |
| #6 oil | 1 Gallon | 150,000 |
| Nat. Gas | 1 Therm | 100,000 |
| Propane liq. gas | 1 Gallon | 91,000 |
| Electricity | 1 kWh | 3412 |

Utility Data

Whole Building Electric

| From Date | To Date | Elec Use (kWh) | Electric Bill (\$) | Days |
|-------------------|-----------|----------------|--------------------|------|
| 7/7/2008 | 8/5/2008 | 46,765 | \$11,033 | 29 |
| 8/5/2008 | 9/4/2008 | 46,923 | \$11,074 | 30 |
| 9/4/2008 | 10/3/2008 | 31,147 | \$5,819 | 29 |
| 10/3/2008 | 11/3/2008 | 29,609 | \$5,730 | 31 |
| 11/3/2008 | 12/5/2008 | 26,245 | \$4,389 | 32 |
| 12/5/2008 | 1/7/2009 | 31,040 | \$5,278 | 33 |
| 1/7/2009 | 2/6/2009 | 25,148 | \$5,010 | 30 |
| 2/6/2009 | 3/10/2009 | 25,595 | \$4,643 | 32 |
| 3/10/2009 | 4/8/2009 | 23,648 | \$4,840 | 29 |
| 4/8/2009 | 5/7/2009 | 26,391 | \$4,913 | 29 |
| 5/7/2009 | 6/8/2009 | 33,496 | \$6,851 | 32 |
| 6/8/2009 | 7/8/2009 | 29,565 | \$6,147 | 30 |
| Total Year | | 375,573 | \$75,729 | |

Whole Building Gas

| From Date | To Date | Gas Use (Therms) | Gas Bill (\$) | Days |
|------------------------------------|-----------|------------------|-------------------|------------|
| 7/7/2008 | 8/5/2008 | 4,942 | \$7,413 | 29 |
| 8/5/2008 | 9/4/2008 | 6,741 | \$10,112 | 30 |
| 9/4/2008 | 10/3/2008 | 7,001 | \$10,502 | 29 |
| 10/3/2008 | 11/3/2008 | 10,852 | \$16,278 | 31 |
| 11/3/2008 | 12/5/2008 | 15,986 | \$23,979 | 32 |
| 12/5/2008 | 1/7/2009 | 16,477 | \$24,716 | 33 |
| 1/7/2009 | 2/6/2009 | 18,016 | \$27,024 | 30 |
| 2/6/2009 | 3/10/2009 | 18,397 | \$27,596 | 32 |
| 3/10/2009 | 4/8/2009 | 16,179 | \$24,269 | 29 |
| 4/8/2009 | 5/7/2009 | 13,858 | \$20,787 | 29 |
| 5/7/2009 | 6/8/2009 | 10,502 | \$15,753 | 32 |
| 6/8/2009 | 7/8/2009 | 6,715 | \$10,073 | 30 |
| Total Year | | 145,666 | \$ 218,499 | |
| Total for Summer | | 25,399 | \$ 38,099 | 118 |
| =Summer months to use for baseload | | | | |

Worksheet

Complete all blue cells.

| Building Info | Affordable Housing | Weather Data | |
|---------------|------------------------|--------------|------|
| Total SF | 64320 | Annual HDD | 5006 |
| # of Units | 69 | Annual CDD | 194 |
| 1 BD | 18 | | |
| 2BD | 45 | | |
| 3 BD | 6 | | |
| Electric Rate | \$.20/kWh | | |
| Gas Rate | \$1.50/therm | | |
| Location | Brooklyn NY | | |
| Heating | Atmospheric Gas Boiler | | |

| Usage Information | | |
|-------------------|-----|---------|
| Electric | kWh | Dollars |
| Total | | |

| Gas Breakdown | Therms | Dollars |
|--------------------|--------|---------|
| Gas Baseload (DHW) | | |
| Gas Heating | | |
| TOTAL | | |

| | Therms/SF |
|-------------------------|-----------|
| Heating Consumption/ SF | |
| Heating in BTU/sf | |
| BTU/sf/HDD | |
| % of Fuel Used for DHW | |