Degree-Day Weather Correction Calculation

To adjust for weather effects on energy usage for heating, perform the following calculations:

Sum the annual heating energy use for the base year. In this case, the example is a school in a temperate maritime climate area. We then sum the monthly degree-day data for that same year.
You can develop your own degree-day data from monthly average daily temperatures. For our example, the degree-days for the base year is 6,500 degree-days.

Year 1 (Base Year)

115,800 Therms / 6,500 Heating Degree-days = 17.8 Therms per DD

Year 2

The heating degree-day total for Year 2 at this location is 6,800.
The year was a little cooler than Year 1. So what was the impact on the energy usage?

17.8 Therms /~~DD~~ x 6,800 ~~DD~~ = 121,040 Therms

The difference from Year 1 to Year 2 that can be attributed to the weather is 5,240 therms. If the building energy use is equal to or slightly less than 121,040 therms, then weather is the likely reason for the increased usage.

If the usage in the facility is significantly greater than 121,040 therms, then the building operator or manager should be looking for changes in building use or system efficiency.

If the usage is significantly less than the "degree-day" estimate, then the difference is likely due to decreased usage which may be attributed to conservation measures, heating system changes or changes in use and occupancy.

Converting Energy Units

Comparing electricity at $0.025 per kWh to $0.50 per therm natural gas.

(you have to know the efficiency of the gas unit)

Converting electricity costs to therms:

$$\frac{100{,}000\ \not{BTU}}{\text{Therm}} \times \frac{1\ \not{kWh}}{3{,}413\ \not{BTU}} \times \frac{\$\ 0.025}{1\ \not{kWh}} = \frac{\$\ 0.73}{\text{Therm}}$$

The cost of electricity in equivalent therms.

Adjusting natural gas costs for equipment efficiency:

$$\frac{\$\ 0.50}{\text{Therm}} \times \frac{1}{\underset{\text{Efficiency}}{0.8}} = \$\ 0.63$$

per therm - actual cost of energy delivered to system

Calculating the Break-Even Point

Crucial data necessary for comparison:

Type of Fuel		Gas	Oil
Equipment Efficiency		80%	83%
Unit Cost	$	0.50	?
Unit Thermal Value		100,000	140,000

For Gas:

Calculate cost per million BTU's.

$$\frac{\$\ 0.50}{\cancel{\text{Therm}}} \times \frac{1\ \cancel{\text{Therm}}}{100{,}000\ \cancel{\text{BTU}}} \times \frac{1000000\ \cancel{\text{BTU}}}{\text{MMBTU}} = \$\ 5.00 \text{ per MMBTU's}$$

Adjustment for Efficiency:

$$\frac{\$\ 5.00}{\text{MMBTU}} \times \frac{1}{0.8} = \$\ 6.25 \text{ per MMBTU's}$$

For Oil:

Since you know the cost of a MMBTU of natural gas is $6.25, you now want to know what that cost is per gallon of oil.

$$\frac{\$\ 6.25}{\cancel{\text{MMBTU}}} \times \frac{140{,}000\ \cancel{\text{BTU}}}{\text{gallon}} \times \frac{1\ \cancel{\text{MMBTU}}}{1{,}000{,}000\ \cancel{\text{BTU}}} = \$\ 0.88 \text{ per gallon}$$

Adjustment for Efficiency:

$$\frac{\$\ 0.88}{\text{per Gal.}} \times \frac{1}{0.83} = \$\ 1.05 \text{ per gallon}$$

The cost of oil has to be less than $1.05 per gallon to be a better energy . value than natural gas at $0.50 per therm (with the efficiencies cited)