

Gas Bills, Heating Degree Days, and Energy Efficiency

Here is a typical story about an Ohio family concerned with saving money and energy by better insulating their house.

Kevin and Shana Johnson's mother was surprised by some very high gas heating bills during the winter months of 2007. To improve the energy efficiency of her house, Ms. Johnson found a contractor who installed new insulation and sealed some of her windows. He charged her \$600 for this work and told her he was pretty sure that her gas bills would go down by "at least 10 percent each year." Since she had spent nearly \$1,500 to keep her house warm the previous winter, she expected her investment would conserve enough energy to save at least \$150 each winter (10% of \$1,500) on her gas bills.

Ms. Johnson's gas bill in January 2007 was \$240. When she got the bill for January 2008, she was stunned that the new bill was \$235. If the new insulation was going to save only \$5 each month, it was going to take a very long time to earn back the \$600 she had spent. So she called the insulation contractor to see if he had an explanation for what might have gone wrong. The contractor pointed out that the month of January had been very cold this year and that the rates had gone up from last year. He said her bill was probably at least 10% less than it would have been without the new insulation and window sealing.

Ms. Johnson compared her January bill from 2008 to her January bill from 2007. She found out that she had used 200 units of heat in January of 2007 and was charged \$1.20 per unit (total = \$240). In 2008, she had used 188 units of heat but was charged \$1.25 per unit (total = \$235) because gas prices were higher in 2008. She found out the average temperature in Ohio in January 2007 had been 32.9 degrees, and in January of 2008, the average temperature was more than 4 degrees colder, 28.7 degrees. Ms. Johnson realized she was doing well to have used less energy (188 units versus 200 units), especially in a month when it had been colder than the previous year.

Since she used gas for heating only, Ms. Johnson wanted a better estimate of the savings due to the additional insulation and window sealing. She asked Kevin and Shana to look into whether the "heating degree days" listed on the bill might provide some insight.

Argon Energy Co.	Customer	Bill Date
	Ms. Arlene Johnson 42 Bluebonnet Avenue Columbus, OH 43205	January 31, 2008 Account # 55-73342B Residential
Current Itemized Bill		
December 30 reading actual		6300
January 31 reading actual		6488
Total units used January 2008		188
January 2008:	1108 heating degree days 0 cooling degree days	
Price per unit @ \$1.25		\$235
Energy Use History		
Total units used January 2007		200
January 2007:	1000 heating degree days 0 cooling degree days	
TOTAL CURRENT CHARGES		\$235

- Assess the cost-effectiveness of Ms. Johnson's new insulation and window sealing. You will need to research "heating degree days" on the internet. In your response, you must do the following:
 - Compare Ms. Johnson's gas bills from January 2007 and January 2008.
 - Explain Ms. Johnson's savings after the insulation and sealing.
 - Identify circumstances under which Ms. Johnson's January 2008 gas bill would have been at least 10% less than her January 2007 bill.
 - Decide if the insulation and sealing work on Ms. Johnson's house was cost-effective and provide evidence for this decision.
- Create a short pamphlet for gas company customers to guide them in making decisions about increasing the energy efficiency of their homes. The pamphlet must do the following:
 - List the quantities that customers need to consider in assessing the cost-effectiveness of energy efficiency measures.
 - Generalize the method of comparison used for Ms. Johnson's gas bills with a set of formulas, and provide an explanation of the formulas.
 - Explain to gas customers how to weigh the cost of energy efficiency measures with savings on their gas bills.

When you have completed your pamphlet, upload it using the button below.

