

# Calculating Fuel Savings

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## Gathering The Information

There are a few things we need to obtain in order to perform the calculations. They are:

### **The present annual fuel use.**

- We need the last 12 months of heating bills for our customer's home. This will allow us to determine the approximate amount of gas used for heating during the last year. Gas is usually billed by the therm. A therm is 100,000 Btu of heat.
- If the furnace is on its own gas meter, we will have an accurate accounting of the annual fuel used by the furnace. However, if other gas-fired appliances are also on the same meter, some adjustments must be made to determine the approximate number of gas therms that were used by the furnace. Compare the amount of gas used by the gas stove and water heater during summer months when the furnace is not used. Use these figures to adjust the gas used during the heating months and arrive at a reasonable annual fuel usage for the furnace alone.

### **The cost per therm of gas charged to the customer.**

- Simply read the cost for each therm of gas off the latest utility bill.

### **The efficiency of the existing furnace.**

- The actual efficiency of the existing furnace can be determined by performing a combustion analysis using a digital combustion analyzer made for this purpose. These analyzers are also used to tune a furnace and perform carbon monoxide safety checks.

### **The efficiency of the new higher efficiency furnace.**

- Simply use the rated efficiency of the new furnace that will be replacing the existing furnace.

## The Calculation

The fuel savings calculation is as follows:

$$\text{Annual Fuel Savings} = \text{Current Annual Fuel Use} \times \left( \frac{1}{\text{Existing Efficiency}} - \frac{1}{\text{New Efficiency}} \right)$$

In this example, we shall say we determined from the customer's utility bills that the annual fuel usage for the last 12 months was 1,300 therms and the current furnace is 68 percent efficient as determined by a combustion efficiency test. The new replacement furnace has an efficiency rating of 82 percent. The efficiencies are placed in the equation as decimals. Placing this information in our equation gives the following calculations and results.

$$\text{Annual Fuel Savings} = 1,300 \text{ therms} \times \left( \frac{1}{0.68} - \frac{1}{0.82} \right)$$
$$\text{Annual Fuel Savings} = 1,300 \text{ therms} \times 1.470 - 1.219$$
$$\text{Annual Fuel Savings} = 1,300 \text{ therms} \times 0.251$$
$$\text{Annual Fuel Savings} = 326.3 \text{ therms}$$

The approximate annual fuel saved by replacing the 68 percent efficient furnace with the 82 percent efficient furnace is 326.3 therms.

According to the utility bill the customer is billed at \$0.85 per therm. Therefore, by multiplying the therms saved by the cost per therm we can determine the annual cost savings expected.

$$\text{Annual Cost Savings} = \text{Annual Fuel Savings} \times \text{Cost Per Therm}$$
$$\text{Annual Cost Savings} = 326.3 \text{ therms} \times \$0.85$$
$$\text{Annual Cost Savings} = \$277.35$$

The annual cost savings is only one of several factors the customer should consider when deciding to replace a system. Other factors include the increased comfort from the new system, increased dependability, increased safety, peace of mind, and increased resale value of the home. Don't forget the possibility that the local utility may have an energy rebate available for upgrading to a more efficient furnace.

The technician or salesperson who can show the customer the expected savings has the advantage over those who do not. In addition, simply performing the calculations for the customer often closes the sale simply because it shows the customer that the technician or salesperson "knows his stuff."

If the replacement of the furnace also includes additional work such as sealing leaking duct joints, the repair or addition of insulation on ducts, and the installation

of a programmable thermostat, the annual savings will be higher still.

Similar calculations can be performed for oil-fired boilers and furnaces. Still other calculations are available to calculate the energy savings possible for air conditioning and heat pump systems when upgrading to equipment with higher SEER ratings.

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