COMPARING HEATING FUEL COSTS

Heat is a large part of the cost of producing plants. When upgrading or building new greenhouse facilities you usually have a choice of which heating equipment to install. One of the basic questions is which fuel to select. If you are purchasing fuels, prices vary considerably during the year and from year to year. There is no easy answer to the question.

A common method of looking at fuel costs is to compare them on a million British Thermal Unit (Btu) basis. What does it cost to purchase one million Btus of energy of a particular fuel? You can do this calculation if you know the heat equivalent of the fuel, the average heating system efficiency and the cost of the fuel in typical purchase units. This can be applied to any type of fuel.

The formulas in the table allow you to compare the cost of different fuels based on the fuel cost and typical heating system efficiency. These do not take into account the cost of the heating system, the maintenance, or in the case of solid fuel, the labor of tending the heating unit.

Let's look at an example.

In the Northeast U.S., a grower wanting to upgrade his heating system has to decide between fuel oil at $4 per gallon burned in a floor furnace with 80 percent efficiency or propane gas at $3 per gallon burned in a high efficiency, condensing unit heater with 93 percent efficiency. Both systems are eligible for an energy grant.

Using the above formulas we get the following:

Fuel oil - $/MBtu = $/gallon x 9.0 = $4/gallon x 9.0 = $36.00/MBtu

Propane gas - $/MBtu = $/gallon x 11.6 = $3/gallon x 11.6 = $34.80/MBtu

Other considerations before a choice is made include: trends in future fuel supply and costs, any difference in cost between the heating units, generally lower maintenance costs for gas units and about 40 square feet of additional growing space due to the unit heaters being mounted overhead.

To adjust the multiplier in the above formulas for a different heat equivalent or heater efficiency use the following formula:

$$\text{Multiplier} = \frac{1{,}000{,}000}{\text{fuel content (Btu)} \times \text{furnace/boiler efficiency (\%)}}$$

For example, check out line 1 of the accompanying table: The multiplier for fuel oil with 138.500 Btu/gallon and 70% efficiency is calculated as follows:

$$\text{Multiplier} = \frac{1{,}000{,}000}{138{,}500 \text{ Btu/gal} \times 0.70} = 10.3$$

Significant saving can be made by selecting the right heating fuel. Comparison of cost on a million Btu purchased provides an easy method for doing just that. GM

Comparing Fuel Costs

Fuel	Heat equivalent	Burner Efficiency	Cost - $/Million Btu
Fuel oil	138,500 Btu/gallon	70%	$/MBtu = $/gal x 10.3
Fuel oil	138,500 Btu/gallon	75%	$/MBtu = $/gal x 9.6
Fuel oil	138,500 Btu/gallon	80%	$/MBtu = $/gal x 9.0
Waste oil	125,000 Btu/gallon	70%	$/MBtu = $/gal x 11.4
Natural gas	103,000 Btu/ccf	75%	$/MBtu = $/ccf x 12.9
Natural gas	103,000 Btu/ccf	90%	$/MBtu = $/ccf x 10.8
Natural gas	103,000 Btu/ccf	93%	$/MBtu = $/ccf x 10.4
Propane	92,500 Btu/gallon	75%	$/MBtu = $/gal x 14.4
Propane	92,500 Btu/gallon	90%	$/MBtu = $/gal x 12.0
Propane	92,500 Btu/gallon	93%	$/MBtu = $/gal x 11.6
Hard coal	25,000,000 Btu/ton	75%	$/MBtu = $/ton x 0.053
Hardwood	20,000,000 Btu/cord	70%	$/MBtu = $/cord x 0.071
Softwoods	12,000,000 Btu/cord	70%	$/MBtu = $/cord x 0.119
Wood Pellets	16,000,000 Btu/ton	80%	$/MBtu = $/ton x 0.078
Wood chips			
Green (45% m.c.)	9,000,000 Btu/ton	75%	$/MBtu = $/ton x 0.148
Green (45% m.c.)	2,000,000 Btu/cu yd	75%	$/MBtu = $/cu yd x 0.667
Dry (10% m.c.)	4,800,000 Btu/ton	80%	$/MBtu = $/ton x 0.084
Corn	16,400,000 Btu/ton	80%	$/MBtu = $/ton x 0.076
Vegetable oil	120,000 Btu/gal	70%	$/MBtu = $/gal x 11.9
Electricity	3,412 Btu/kilowatt-hour	100%	$/MBtu = $/kw-hr x 293

SOLUTIONS SOURCE

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HAVE A QUESTION?

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