

ENERGY CONSERVATION FOR GREENHOUSE GROWERS

Record low temperatures and skyrocketing fuel prices are serious economic issues for greenhouse growers in Mississippi. To confront these issues, growers must do everything possible to stretch energy resources.

The following energy conservation topics will help you get the most out of your greenhouse energy dollar. Although some measures are relatively simple and straightforward, with minimum cost, others are more involved, with varying degrees of expense. As a greenhouse operator, consider the following factors in making your energy conservation decisions.

MAINTAIN THE HEATING SYSTEM

With high fuel costs, it's easy to overlook the importance of maintenance in lowering costs. However, a problem in the heating system adds to these already high costs. Have your heating equipment serviced regularly to make sure it is operating at peak efficiency. Keep a record for future reference of all services performed.

USE GREENHOUSE COVERINGS

The type of greenhouse covering material has a dramatic impact on heat loss. For example, single-layered glass loses almost twice the heat because of conduction and radiation as a double layer of polyethylene film. A single layer of polyethylene film over glass reduces heat loss by almost 25 percent compared to single-layered glass alone. Inflate double layers of film 6 inches apart for maximum insulation effect.

STOP AIR LEAKS

In many ways, a greenhouse is no different from a home or any other structure with energy conservation. Air leaks can be a major cause of heat loss. Caulking and weatherstripping around glass laps and other locations can reduce the amount of outside air entering the building. Although savings vary, older greenhouses usually benefit the most in savings. Caulking and weatherstripping can reduce heat loss up to 37 percent in some buildings. Be sure to use water-resistant silicone sealant. Also check the siding on houses to make sure it is completely closed. Using curtains or

other internal insulation also helps reduce heat loss.

MAINTAIN PROPER VENTING

A common area for problems in heating equipment is the venting system. A heating system is only as good as the venting system to which it is connected. A poor venting system may cause improper fuel combustion, reduced efficiency, and potentially harmful fumes; it may be a safety hazard. A heating contractor can tell you if venting is a problem in your operation.

USE GREENHOUSE SPACE

Use only as much greenhouse space as needed. Place plants pot-to-pot, filling up as few greenhouses as possible. Space them out using more greenhouses as needed.

GROUP PLANTS BY COLD-TOLERANCE

Use a thermometer and don't set temperatures higher than needed. Group crops with similar temperature requirements when possible. Put cold-sensitive plants in one house and cold-tolerant plants in another.

COMPARE FUEL PRICES AND EFFICIENCY

Although availability and heating equipment are important factors in choosing a heating fuel, a key consideration is a fuel's efficiency and Btu's (units of heat) produced per dollar. Fuels burn differently and produce different amounts of heat. For comparative purposes, use these efficiency guidelines:

- Natural gas: 1,000-1,200 Btu's per cubic foot
- Liquid propane: 91,500 Btu's per gallon
- No. 2 diesel: 140,000 Btu's per gallon
- No. 6 fuel oil (used motor oil): 150,000 Btu's per gallon
- Electricity: 3,412 Btu's per kWh (kilowatt hour)

To determine the Btu value per dollar, divide the fuel's Btu per unit by the unit price. Here are examples. Keep in mind that changing fuel prices affect a particular fuel's Btu value per dollar (if the unit price changes, simply substitute the new price).

- At 80 cents per 100 cubic feet, natural gas gives 125,000 Btu's per dollar.
- At \$1.50 a gallon, liquid propane gives 61,000 Btu's per dollar.
- At \$1.40 a gallon, number 2 diesel fuel gives 100,000 Btu's per dollar.
- At 6.2 cents per kWh, electricity gives 55,032 Btu's per dollar.

SHOP FOR PRICES

It is possible to buy natural gas nationwide from the highest bidder, although it is probably easier for most growers to buy directly from the local utility. Some growers have saved about 15 percent on gas prices by shopping across the country. This usually involves buying from a gas corporation, hiring a pipeline company, and then hiring the local utility to deliver it. Reliability of service is a critical issue if you plan to shop around. Check with your local gas utility about buying your own gas and having it delivered to you.

BUY FUEL IN THE OFF-SEASON

Although this won't help with the current winter's heating bill, buying fuel in the summer when it is more abundant and cheaper can help with next winter's fuel bill.

EVALUATE YOUR HEATING METHOD

Alternative heating methods such as *radiant heating*, which heats the object and not the air space itself, may be an option for some growers. Such systems are designed specifically for greenhouses and direct infrared heat directly onto plants, floors, benches, and walkways, which in turn become secondary heat-producing sources. Although not fully researched, reports by growers suggest radiant systems may save 30 to 50 percent on fuel bills. The same reports suggest air temperatures in radiant-

heated greenhouses can be up to 7 degrees cooler than in conventional hot-air systems with equivalent plant growth.

Convection heaters are an option for hobby and small commercial greenhouses. Although not as automated as more sophisticated systems, their relatively low price is attractive to some growers. These heaters use many types of fuel, including wood, coal, oil, or gas combusted in a firebox. The heater is usually at one end of the house and exhaust exits are at the opposite end. Heat passes through an exhaust pipe along the ground between ground beds or beneath benches. It is important that the exhaust not contact the crop, because incomplete combustion or impurities in fuels may injure greenhouse plants.

Solar heat is yet another option gaining attention with the high costs of fossil-fuel-based systems. Not yet in widespread use, advances in technology may make solar heat more attractive as a heat source for greenhouses. With solar heating systems, a back-up unit is usually required to provide supplemental heat when solar heating is not enough to meet plant needs.

OTHER CONSIDERATIONS

When evaluating heating methods and fuel choices, consider many factors in addition to cost. For example, although wood or oil-fired convection heaters may be cheaper than natural gas or propane units, make sure the heater adequately protects plants overnight or at other times when the greenhouse may be unoccupied. Also, incomplete combustion or impurities in some types of fuels can injure greenhouse plants. When deciding on a fuel choice, availability is a major factor. Many growers use natural gas when available, but many rural growers don't have access to gas pipelines and must use other fuels. Always follow safety precautions when using any fuel. Call your gas company or utility if you have questions.

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