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# 10 easy ways to save energy and money

**F**uel and electric bills are at the forefront of our minds as we head into winter. It seems that there is no limit to how high the cost of fuel and electricity will go. This is influencing the way growers plan their production and operate their greenhouses.

As I visit growers, I still find that some of the simplest conservation measures have not been put in place. Questions on alternate energy systems or expensive retrofits are common, but looking around the greenhouse, the large gaps under the door or simple insulation measures are overlooked as a way to achieve significant savings.

## The top 10

Check your greenhouses for these 10 energy savers that cost very little to implement.

**1. Reduce infiltration.** Gaps under exterior doors, in shutters or vents and around the foundation can allow a considerable amount of heated air to escape. For example, a 48-inch fan shutter that fails to close properly leaving 1-inch gaps allows 23,000 Btu of heat to escape each hour costing \$0.45 with \$2 per gallon fuel oil or \$1.38 per therm natural gas. A little time spent installing weather stripping, foam crack sealer or placing insulation board over the vents will reduce this to a minimum.

**2. Insulate the kneewall to bench height.** Heat loss from a greenhouse is directly related to the surface area, insulation value of the glazing and the temperature difference between inside and outside air. Although the sidewall surface of a greenhouse is less than 20 percent of the overall surface of the greenhouse, the heat loss can be significant.

I have measured reductions in kneewall surface temperatures of 40°F when an inch of insulation board or a piece of aluminum foil was placed between the heat pipes and the wall.

**3. Install pipe insulation.** Whether it's the ¾-inch pipe that

supplies the sink or the 4-inch line from the boiler, there is considerable heat loss from hot-water pipes. This heat loss continues every day the system operates.

Payback for insulating pipes usually takes less than two years. Using the above fuel cost figures, the approximate annual savings for installing 1-inch-thick fiberglass or foam pipe insulation on the ¾-inch pipe will be \$2.50 per foot and \$10.15 per foot for the 4-inch pipe.

**4. Service the heating system each year.** A thorough cleaning and adjustment of the burner can increase efficiency at least 5 percent on most heating units. The most important adjustment is the air supply setting. Too little air results in incomplete combustion; too much air carries some of the heat up the chimney.

On oil burners, other areas to check are the oil pressure, nozzle type and angle and electrode spacing. On gas burners check for blocked gas orifices, gas leaks and obstructions in the vent system. On both types adjust the barometric damper. Provide at least 15 cubic feet of makeup air per 1,000 Btus of heat.

**5. Calibrate the heating system sensors for better temperature control.** Thermostats lose their accuracy over time. The calibration can be checked by placing an accurate thermometer next to a thermostat and slowly turning the dial until the heater comes on. If the reading is not the same temperature as the thermometer, mark the thermostat accordingly. A 1- to 2-degree difference could save more than \$100 in fuel costs per year.

Better sensing of temperature in the greenhouse can be achieved by placing the thermostats inside an aspirated box (a wooden box with a muffin fan that pulls air past the sensors). Tests at Rutgers University showed that the temperature fluctuation between the on and off posi-

tion was reduced from 8°F to 2°F by using an aspirated box.

**6. Modulate boiler water temperature for savings.** A radiator filled with 180°F water when the thermostat shuts off the circulator pump will continue to provide heat for some time, overheating the greenhouse and increasing the heat loss. Installing a three- or four-way mixing valve and temperature sensor will lower the water temperature in the radiators as the setpoint is reached. This reduces the redundant heat and saves fuel.

**7. Install root-zone heat.** Providing heat where it is needed can save considerable energy. For most plants, the root-zone temperature is more important than the air temperature. Adding heat in the floor or under the benches can provide a first stage of heating. As the heat rises, it heats the air. For hoop houses and small gutter-connected houses, a domestic hot-water heater can supply adequate hot water for the root zone at low cost.

**8. Add a germination chamber to start seedlings.** A germination chamber in the head house or basement will allow you to keep the greenhouse closed for an extra two or three weeks in early spring. Installing 25-30 watts of fluorescent lighting per square foot of growing area will provide both the light and heat needed for good germination and seedling light requirement.

**9. Check fan belt tension and alignment.** Loose belts and pulleys that are out of alignment reduce fan output considerably. Use a straight edge to check alignment of the pulleys and adjust the belt so that it has no more than ½-inch depression between the pulleys.

**10. Install a motion detector to activate security lighting.** Research has found that vandals are scared off more by lights that come on when they enter an area than by continuous lighting. This can save considerable electricity over the year. **GM PRO**