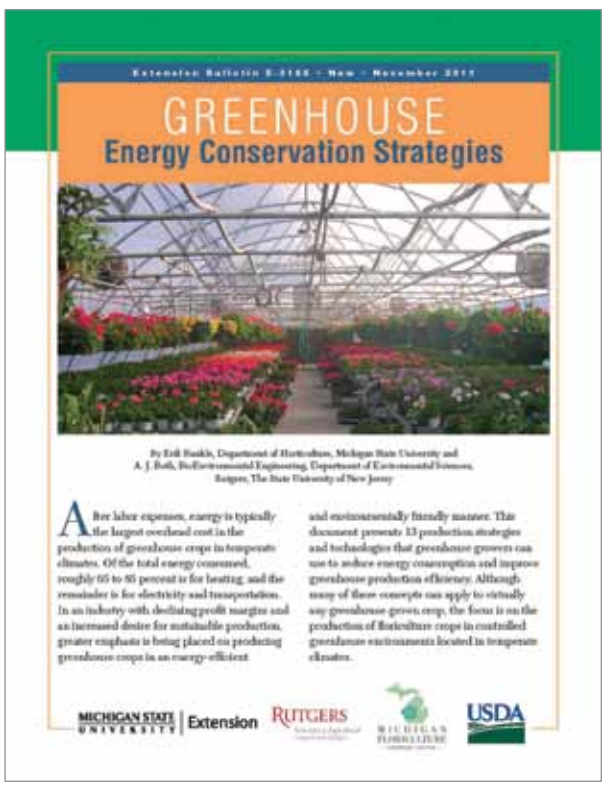
By Erik Runkle and A.J. Both

Greenhouse Energy Conservation Strategies

As energy prices continue to remain high, growers are keen on energy conservation strategies, especially when their operations are located in colder climates. Ultimately, growers are interested in reducing the amount of energy required to produce a unit of product — whether it is an ornamental or a food crop. Recently, we wrote a 16-page bulletin that describes energy conservation strategies and technologies that can potentially lower heating and electrical costs. While some of these strategies appear obvious, obtaining maximum energy savings requires careful attention to detail. In this article, we highlight five energy conservation strategies, while the remaining ones, as well as more specific information and resources for more information, can be downloaded free at www.flor.hrt.msu.edu/energy.

Use efficient photoperiodic lighting when growing long-day plants. When the natural day length is short, many bedding plants and herbaceous perennials flower earlier when provided with artificial long days. A significant amount of energy can be saved by replacing traditional incandescent lamps with more efficient light sources or using alternative lighting strategies. For example, every other incandescent lamp can be replaced with a compact fluorescent lamp (CFL) that consumes a quarter of the energy (a 25-watt CFL replaces a 100-watt incandescent lamp). Flowering of some crops such as petunia can be delayed if all incandescents are replaced with CFLs. Alternatively, cyclic (or intermittent) night-interruption lighting can be used instead of lighting four hours continuously each night.

Cover page of the 16-page bulletin Greenhouse Energy Conservation Strategies, *which discusses 13 energy conservation strategies and technologies that can potentially reduce heating and electrical costs. It can be downloaded free at www.flor.hrt.msu.edu/energy.*



Manage greenhouse temperature based on the crop and finish date. Plant development rate decreases with temperature, which is why crops take longer to flower when grown at cooler temperatures. In some situations, especially in the Northern parts of the country and in early spring, more energy may be consumed by growing a crop at cooler temperatures than growing it warmer to accomplish a shorter finish time. You can evaluate the impact of temperature on your crops by using the software Virtual Grower to estimate finish time and energy consumption. Keep the growing area filled with plant material as much as possible so as to reduce the heating cost per unit of product.

Reduce air leaks. It is quite common to find unintended cracks and openings, where the warm greenhouse air escapes to the cold outdoors. These potential air leaks can be identified by closely inspecting the greenhouse glazing, walls, doors, fans, vents, and other areas. Pay special attention to where the covering material attaches to the foundation, side and end walls, and around fans and vents. Patch holes; keep doors closed; weather-strip doors and windows; ensure fan louvers close tightly; and shut off and cover unused exhaust fans from late fall through early spring. If you have a double poly greenhouse, be sure it is properly inflated using outside air in order to reduce condensation between the layers.

Install and maintain retractable curtains. Growers have reported significant seasonal energy savings of up to 30 percent with the installation of energy curtains, often resulting in a quick return on investment. Be sure to install stationary skirts around the outer edges of the curtains to prevent unwanted air movement towards the colder air above the curtain. Once you have a curtain system, be sure to periodically inspect it and repair or replace sections that have holes or tears. Make adjustments when needed so that curtains close tightly to seal in the warm air. Open curtains gradually in the morning to prevent the cold air from rapidly dropping onto the crop.

Install and maintain horizontal air flow fans (HAFs). HAFs mix the greenhouse air to improve the uniformity of temperature, humidity and carbon dioxide, while using a minimal amount of energy. HAFs should be shielded with a screen for safety reasons and some designs include a shroud for improved efficiency. Fan motors should be rated for continuous operation and have thermal overload protection. Use a sturdy mount to prevent rocking during operation. Install HAFs in a 'racetrack' layout so that the air moves in horizontal, circular patterns and regularly inspect fans to ensure they are operating properly. g

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