

Control Your

24(12): 82-83

Greenhouse Grower Oct. 2006

A Whole Lot Of Hot Air

Quick fixes may actually cost you more in the long run.

by BRAD KENNEY

Assistant Editor
bpenney@meistermedia.com

The cheapest thing to buy isn't always the best thing to buy," says Jim Kramer of Delta T Solutions, echoing one of the truest statements ever made. The bottom line always looms large in any investment decision, but what initially seems like the cheapest solution to your heating problem can actually be a deceptive mirage, with the true costs of your inefficient equipment lost in the heat shimmer coming off your pipes.

With a background that encompasses more than 25 years in the greenhouse industry, first as a greenhouse facility manager at the University of Illinois and the last six years in the greenhouse heating side of the industry, now with Delta T Solutions, Kramer can see through the haze to the underlying structure of heating systems in the North American market, both as they currently

stand and where he thinks they should be moving.

"A lot of growers have been around for a while, some for a couple of generations," he says. "They know they're going to be here and growing plants, they believe in their businesses, they know they have the customer base and what their operating costs are. But they're getting sick of paying so much to feed their hot air equipment. Even if they're surviving right now, a lot of what we're hearing is people saying, 'If my costs get too high, that's bad for my business.

I don't want to be paying the power company just to stay afloat." With this aim in mind, Kramer has a few recommendations for growers with outdated systems looking to get a clear view of the future.

1 – An Honest Look

The first step is to evaluate what you have, as efficiency levels can range greatly depending upon what is used and how. Kramer references published data (see table) indicating that the efficiency of the gas-fired unit heater is relatively low — and that's just the start.

"The unit heaters we sell are over 80 percent efficient as a heat source, but when you mount them higher up in the greenhouse, that overall efficiency number goes way down," he explains. Kramer also cautions growers to take a hard look at what efficiency numbers actually mean.

"You have to look at the overall design of the heater for a true efficiency picture," he says. "If you look at just the burner efficiency, then that's one thing, but you have to look at how this heater fits into your overall system."

For example, infiltration of air can be a major culprit in outdated heaters or in heaters not designed for greenhouses. Kramer points out that some growers are still using "gravity stack" heaters in which the air intake stays open all the time, with a draft continually passing through

Energy Savings Calculator

| | | | | |
|---|---|--|--|--|
| Source Efficiency <small>Boilers, unit heaters, etc.</small> | 76% | 81% | 89% | 92% |
| Distribution Efficiency <small>Fan tubes, unit heaters, etc.</small> | 60% | 80% | 80% | 90% |
| Heating System Efficiency <small>For source and distribution</small> | 46.8% | 64.8% | 68.0% | 82.8% |
| Annual Fuel Load <small>MMBtu/yr</small> | 6,847 | 4,945 | 4,713 | 3,870 |
| Annual Heating Cost | \$8,163 | \$4,451 | \$4,241 | \$3,483 |
| Annual Cost/Sq Ft | \$0.88 | \$0.54 | \$0.61 | \$0.50 |
| Source: TrueHeat Technologies www.trueheat.net | Option 1 Standard gravity stack unit heater w/HAF fans | Option 2 Under-bench aluminum fin-pipe heating w/ standard boiler | Option 3 Under-bench aluminum fin-pipe heating w/ efficiency boiler | Option 4 In-slab floor heat w/fin-pipe top heat and high efficiency condensing boiler |

Energy Costs

it - a solution that Kramer sees as defying logic. "If you have a heater that's open to the outside, you're going to lose warm air — air that you've paid to heat up — from your greenhouse!"

The next step up the ladder of efficiency is induced-draft heaters with a fan that only brings air in when the heater is running. This means it will burn more efficiently and won't waste heat through infiltration, leading to a higher efficiency rating. Still, the heat source, although a good place to start, is just one part of the picture.

2- Pick A Crop

The next question is what to grow, and when? It would be a wonderful thing if there could be a single viable solution for every greenhouse in the country, such as in Holland where a consistent climate and the clock auction system make for many monoculture growers with similar problems and common solutions. However, the incredible diversity of a landscape that stretches from northern tundra to southern swamp, makes not only for unique market dynamics, but for a complex technical situation for North American growers, as well.

"The needs of any specific greenhouse varies from region to region," says Kramer. "In Ohio, the heating season is six months. In California, they're using heat to a lesser extent, but using it all year-round, especially for propagation."

Which brings up another crucial point — the needs of any system also depends on the crop mix that growers are seeking to shelter from the storm.

"Some crops just can't handle 45°F or 50°F nights," he notes, adding that these types of concerns can be answered through consultation with other growers, Extension agents and allied trade representatives. "All of these questions should be figured out prior to investment."

3 -What To Buy?

According to Kramer, the next step is to look at whether something along the lines of a brand new, super-efficient floor heat system with a condensing boiler even makes sense.

"In most cases, if the grower is using unit heaters, they could be doing better with hot water. However, on the flipside, some growers don't want to invest a lot of capital in a whole new hot water system if they're only heating their greenhouses in the springtime," he says. On the whole, though, "We've been seeing a lot of growers starting to worry about efficiency. We get a lot of calls from growers who have unit heaters and who know how much they cost to run. They now want to add benchtop heating and keep the unit heaters to fill in during the coldest months." Kramer gives the example of Ohio, where most greenhouse systems are designed to handle -10°F or -15°F lows.

"How often do you hit that?" he wonders. "In Illinois, some winters would barely get down to zero. As your first stage of water heat, a benchtop system could actually supply majority of the heat because it's not as cold outside as the system's design temperature can handle." There are better methods to achieve a more

efficient system, Kramer says, but explains this may be a good cost-saving step at a reasonable expense.

"Unit heaters combined with a slab heating system often make sense for all the same reasons, with the next step up being, of course, an all-hydronic system," he concludes, adding that no matter the heat source, HAF fans are another way to help growers distribute the hot air around the greenhouse and therefore even out the overall air temperature.

4 -Think Long-Term

Whatever the most cost-effective and fuel-efficient solution may be, there's always that bottom line (whether real or imagined) lurking out there to mislead growers into trying a quick fix.

"A hot water heating system is going to be more up front, sure. But if you're going to use it enough, the system will pay for itself in the long run. A lot depends on how far down the road the grower is willing to think," observes this long-time industry member. "With our gas costs rising, people are being forced to get more efficient, and what do they do? They move from hot air to hot water. It's happening already, so why invest your good money in a short-term solution?" GG

Per volume, water can carry 3,500 times the energy of air. To put it in graphic form, the energy contained in the single cubic foot of water carries the same heat energy as 3,200 cubic feet of hot air.