GROWERTALKS

Features

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How to Heat Your Greenhouse: The Complete Grower's Guide

Jim Rearden

Heating is one of the most critical aspects of greenhouse production. It affects crop health, operating costs and overall profitability. For decades, many growers have relied on the same basic heating systems, but today's rising energy prices and advances in technology provide new opportunities to improve efficiency and reduce costs.

This guide outlines traditional heating methods, the challenges they pose and modern solutions—including hydronic heating, high-efficiency unit heaters and condensing boilers—that help growers deliver consistent plant growth while lowering fuel consumption.

Energy: A major operating expense

For most greenhouse operations, energy is the second-largest expense after labor. Fuel costs directly affect profitability and wasted energy can significantly reduce margins. By upgrading to more efficient systems, growers can reduce operating costs while improving production outcomes.

The traditional approach: Unit heaters or "high-mass" boilers

Unit heaters have long been a standard heating method in North America. They're relatively inexpensive to purchase and easy to install, which makes them attractive for many facilities.

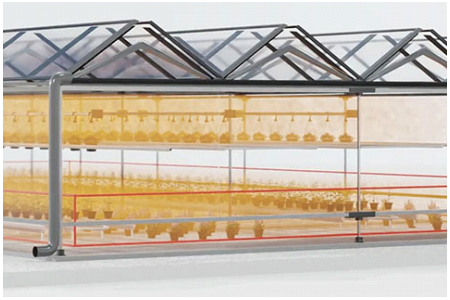
The drawback is that unit heaters primarily warm air rather than plants. Because crops often occupy only about 10% of the greenhouse volume, the majority of that heated air isn't being used effectively.

Still, unit heaters continue to play an important role, particularly when upgraded to modern, high-efficiency models. Sterling unit heaters are an example of this next generation of equipment. Designed for improved performance, they provide reliable heating while reducing fuel consumption compared to older units. In many operations, Sterling heaters are used as a supplemental or back-up system alongside more efficient hydronic heating solutions.

The challenge: Heating empty space

Traditional air-based heating systems can leave growers paying to heat unused space. Warm air naturally rises, leaving the crop zone cooler while heat accumulates at the roof.

Because plant roots are the most critical area to keep warm, an effective heating strategy needs to direct energy to this zone first.



Hydronic heating: A targeted solution

Hydronic heating addresses this challenge by circulating hot water through pipes installed under benches, in floors or across growing areas. Heat radiates upward, warming plants at the root zone instead of filling the entire greenhouse with heated air.

Water is an efficient transfer medium that allows precise, reliable heating. By moving heat with water, growers reduce waste, stabilize root-zone conditions and improve overall crop health. In fact, per volume, water carries 3,500 times the amount of heat that air can carry.

Flexible systems for any size

Hydronic heating is adaptable to greenhouses of all sizes—from small propagation facilities to multi-acre production ranges. BioTherm offers modular systems that scale with the operation, making high-efficiency heating practical for both small growers and large commercial operations.

Proven BioTherm solutions

BioTherm provides a range of hydronic heating systems, including:

- Roll'N Grow—Flexible tubing rolled out across floors or benches to deliver direct heat to plants.
- MicroClimate—Tubing installed on benches or floors for canopy-level heating.
- In-Floor Heating—Tubing embedded in concrete slabs for durable, consistent heat.

These solutions ensure energy is delivered directly to the plant environment, maximizing fuel efficiency.

Benefits for growers

Growers using hydronic heating report several key advantages:

- Reduced fuel costs—Targeted heating eliminates wasted energy.
- Faster crop cycles—Consistent root-zone warmth accelerates growth.
- Healthier plants—Stable heating reduces disease pressure and plant stress.
- Greater precision—Root zones can be maintained at the optimal temperatures.
- Evenness—Properly engineered hydronic systems deliver heat much more evenly than alternative systems.

Heating the upper zone

Some crops, such as hanging baskets, or conditions like snow loads require upper-zone heating. BioTherm's finned pipe systems provide this capability:

- StarFin—High-efficiency pipes mounted near the perimeter or roofline to warm upper areas.
- DuoFin—Effective under-bench or perimeter heating with simplified installation.
- SunFin—A high-output option for institutional or research environments.

These integrate into the same centralized boiler system, giving growers layered control across the entire greenhouse.

Boilers: The heart of the system

A hydronic system is only as effective as its boiler. Modern condensing boilers achieve far greater efficiency than older models by capturing additional heat from exhaust gases. This is called "condensing" technology as the heat from flue gasses are extracted and put into the heating water.

RBI condensing boilers are an industry leader in this category, with efficiency ratings up to 99%. They're designed to convert nearly all of the fuel used into usable hot water, making them an excellent pairing with BioTherm heating systems. RBI boilers provide dependable, long-lasting performance and can be "platooned" to address any size load.

By combining BioTherm delivery systems with an RBI condensing boiler, growers maximize efficiency and reliability while reducing operating costs.

Straightforward installation

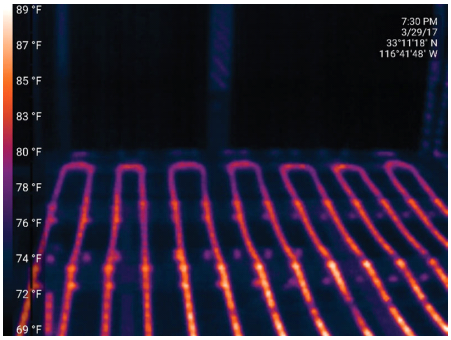
While hydronic heating may sound complex, installation is practical and accessible. Flexible tubing and simple connections eliminate the need for welding, making these systems comparable to installing irrigation.

BioTherm also provides commissioning services, with technicians ensuring the system is optimized for efficiency and performance before growers put it into full operation.

How it works: Step by step

A complete BioTherm heating system typically includes:

1. Plant-zone heating—In-floor, on-floor, or in- or under-bench systems designed around the facility.
2. Supplemental heat—High-efficiency Sterling unit heaters for backup or finned pipe systems for upper zones.
3. Boiler system—An RBI condensing boiler, delivering up to 99% fuel efficiency.



4. Connection—Boiler “loop” connects boiler to the heating system.
5. Commissioning—On-site startup and verification by BioTherm technicians.

This combination ensures an efficient, reliable and customized heating solution.

Trusted by growers worldwide

More than 10,000 growers across the globe rely on BioTherm’s systems. With more than 40 years of experience, BioTherm has partnered with leading equipment manufacturers like Sterling and RBI to make high-efficiency greenhouse heating accessible to operations of all sizes.

These systems have consistently demonstrated reduced energy use, improved crop performance and stronger long-term profitability for growers.

Building for the future

Heating is one of the largest controllable costs in greenhouse production. As energy prices continue to rise, efficient systems are no longer optional, they are essential.

By integrating BioTherm hydronic heating, Sterling unit heaters and RBI condensing boilers, growers can reduce operating costs, achieve consistent plant growth and secure a reliable heating strategy for the future.

The future of greenhouse heating is focused on efficiency, precision and flexibility. While traditional unit heaters remain a valuable backup, high-efficiency hydronic systems paired with advanced condensing boilers offer a smarter path forward.

With proven solutions from BioTherm, Sterling and RBI, growers can take control of energy costs, protect crop health and strengthen their bottom line.
Visit BioThermSolutions.com to learn more and connect with a climate expert. **GT**

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