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# Checklist for Reducing Greenhouse Heating Costs this Winter

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*Yes, I know that propane costs are lower than they have been in many years, but wasting as much as half of your greenhouse heat is still a luxury you can't afford. So let's look at some ways to reduce your heating costs this winter - some inexpensive and quick, and some that take more time and investment.*

We recently held a two-day training for Extension agents and professional energy auditors on the topic of greenhouse energy efficiency at Aaron's Creek Farms in Buffalo Junction VA. One of our guest speakers was Dr. A.J. Both who is an Associate Extension Specialist in Bioresource Engineering in the Department of Environmental Sciences at Rutgers University. (We'll talk about our USDA training on Virtual Grower in another article). So, much of the material that I'm summarizing here came from Dr. Both's first presentation. You can watch his entire presentation on Greenhouse Heating at the link below. <https://www.youtube.com/watch?v=8iZsrpNTVp4>

## Start With Energy Conservation Measures

*Reduce air leaks.* It's surprising how many small - or even large - gaps escape notice during the non-heating season.

- Patch, repair, and/or replace tears/holes in the plastic or glass panes. (photo 1)



Photo 1. Repair all tears right away.

## e-GRO Alert

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- Adjust or replace poor fitting doors and make sure they latch securely to stay closed.
- Adjust louvers and other vent covers to seal tightly. (Photo 2)
- Add weather-stripping to doors and other seals around equipment and openings.



Photo 2. Repair or replace louvers so that they close tightly.

*Perform timely maintenance on heating equipment.*

- Keep burners clean. Just 1/8" of soot can increase fuel use by as much 10%.
- Keep heat exchanger tubes clean - inside and out.
- Keep distribution pipes and fins clean and unobstructed. Photo 3



Photo 3. Placement of heating tubes under benches is more efficient at heating the root zone.

*Maintain proper inflation between poly layers to optimize insulation effect. Photo 4*



Photo 4. Maintain proper inflation.

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Photo 5. Insulation of north endwalls with foam insulation (not for use in vegetable production houses).

*Insulate, insulate, insulate!*

- Insulate the north endwall where your orientation limits useful light. Be mindful of the value of diffuse light where you might want to insulate with “bubble-wrap” materials - works for sidewalls, too. Photo 5

On the “some investment required” side, consider installing perimeter insulation at least one foot deep and one inch thick (deeper and thicker in colder areas).

- Consider adding wind breaks in high wind areas (See [Dr. Both’s video](#) for heat loss due to wind calculations).

*Add horizontal air flow (HAF) fans.* Again, some investment required, but when you tighten up the greenhouse, you must make sure that you have good air circulation to ensure uniformity in greenhouse temperature and relative humidity. HAF fans should be run continuously during the winter.

**Consider Improving Energy Efficiency**

*Add and use retractable energy/shade curtains.* Some investment required, but the payback period can be very short, as little as one season in a very cold winter with high fuel costs.

- Combination curtains for shade in the summer and heat retention in the winter can reduce energy use up

to 30%. Using a separate heat retention curtain reduces heating costs even more.

- Make certain that energy curtains are well fitted on the sidewalls and overhead. Gaps create “chimneys” which remove heated air from the greenhouse. Photo 6

*Consider installing computer control and variable speed motors - may reduce energy costs up to 10%.*

*Consider replacing heaters with new, high efficiency heaters or boilers. Again, some investment required.*

### **Take Action to Reduce Your Energy Costs**

Take the time to evaluate your greenhouse for energy efficiency. Consider having a formal energy audit conducted on your greenhouse. These audits not only identify where improvements can be made but also the approximate payback period for making the investment in those improvements. Various organizations are funding energy efficiency programs. Check with your local Extension office to identify programs in your area.

In addition, there are guidelines available to help you conduct your own greenhouse energy audit. Check out the Greenhouse Energy Cost Reduction Strategies website to which Dr. Both contributes, <http://flor.hrt.msu.edu/energy/>.



Photo 6. Ensure that your energy curtains fit securely to the wall with no gaps between panels to prevent warm air from being drawn out of the heated greenhouse space.