

Ten Ways to Conserve Energy

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Our industry is an energy consuming occupation — more so than agriculture in general. We may claim that we make use of solar energy, but the efficiency is not more than four percent. Without supplemental fossil fuels, greenhouses, as a viable agricultural enterprise will disappear before conventional field agriculture. The second major point is that fuel will never be cheaper than it is today. It will be more expensive tomorrow.

So what can we do? We can move, grow only in the summer, burn the place down, build new structures that make better use of existing technology — backed up with skilled and efficient management, or retrofit our existing greenhouses. Our concern is with retrofitting so that existing producers can survive well enough to meet the long term changes that will be mandatory. Greenhouses as we know them today will eventually cease to exist, but we must have a margin.

We can list ten things we can do to reduce existing energy consumption in greenhouses:

1. Double glaze, mostly double air inflated polyethylene. Some greenhouses are installing poly above fiberglass.
2. Internal "covers", *a la* John White's work at Penn State. Materials and systems to reduce convective heat loss.
3. External "covers", above the greenhouse to reduce radiation heat loss to a cold sky.

4. Reduce infiltration with weather stripping, double entries, tight covers.
5. Insulation on non-productive side-walls, double glazing on gables, running insulation below the ground surface to reduce soil heat loss.
6. Improving system efficiency, using stack temperatures and CO₂ analyzers to bring combustion systems up to maximum output, insulating valves, feed-water tanks, checking traps, injecting CO₂ and heat from the stack.
7. Making use of low temperature tolerant varieties — a whole new field for plant selection.
8. Changing the heating system design so that heat is brought into the greenhouse on the ground level and not in the top where it does nothing.
9. Increase the area in production with use of movable benches, new methods of culture and mechanization.
10. Supplement fossil fuel with more efficient use of solar energy. This includes better cultural practices, better varieties, higher yields, as well as actual energy storage.

The use of some of these methods means that cultural practices must change. Problems of humidity control, disease control, timing, and others must be faced. Our old sloppy methods must cease. In particular, temperature measurement and control must be tightened up with accurate, precise instrumentation, employed in the proper manner. It is a new ball park, and the rules are changing because the dimensions of that ball park have changed.

The best estimate we have is that energy consumption in present greenhouses can be reduced by one-half with existing technology. It may be possible to supplement 25% of the remaining 50% with alternate energy sources such as solar heating.

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