

Ways to Increase Energy Efficiency in Nurseries®

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INTRODUCTION

As we move into uncertain times concerning the use of energy, particularly as it relates to global warming, peak oil and rising costs, it is timely I believe that as an industry we should all be reviewing how each of our businesses can reduce our use of all of the forms of energy that we currently consume.

While many of us are locked into the use of electricity for instance, there are ways that we may be able to reduce our usage by partially supplementing this source of energy. I have attempted in this paper to explain a number of possibilities that I believe might be useful in reaching this goal.

The oil price shock of the 1970s gave the industry a wakeup call in regard to energy conservation, particularly to those that used heating oil exclusively to fire their boilers. As a direct result of this event, which probably now pales into insignificance with the more recent price rises for oil, many nurseries adopted at least some form of energy conservation and in many cases a switch from oil to gas.

Currently we face another challenge with global warming and the possibility of governments imposing either a carbon tax or an emissions trading scheme on industry. So with a combined onslaught of high oil prices as well the rising cost of gas and a carbon tax, there is no way that we can ignore any longer the need to be more conservative.

Many of us, particularly in warmer parts of the world, have been fairly slow to adopt any major change and it is fair to say that after the 1970s oil shock many nurseries failed to make continuing improvements to their structures and other areas of operation. There was a range of inefficient heating devices, thermally inefficient green house structures, inefficient lighting and inadequate or expensive cooling systems.

Lighting for instance in Denmark is an essential part of winter growing so in some cases large growers built their own generating plants, powered by oil and then sold excess electricity into the national grid. Some of these are struggling to stay viable because of the cost of oil and of course the downturn of the last few years in prices for green life. Infrared heating used in the USA in the 1980s is now used much less along with gas-fired heat exchangers.

Probably one of the better legacies from the 1970s was the use of double skinned greenhouses using polyethylene. This practice has continued, particularly with the advent of longer life UV treated polyethylene that has better light penetration and allows the option of using a thinner material as the second skin.

In those regions of the world that need cooling as well as heating, there have been many advances in the development of efficient materials that can be used to build wet walls. At Narromine Transplants we have used a wet wall designed by Munters and using their CELdek system which is as long as the as the propagating greenhouse, positioned at bench height with extraction fans three spans away. We have found great benefit in propagation from this system.

What can we do to save energy using the existing equipment we have available to us?

- Check temperature at crop height, early in the morning
- Make sure temperature is consistent across the crop
- If average temp is higher than needed reduce the thermostat setting
- Buy an infrared thermometer
- On the propagating bench monitor the temperature of the medium
- Ensure you cover as much of the bench as possible with the crop-
Keeping a greenhouse one-degree warmer than needed increases gas consumption by 10% to 15%
- Make sure the greenhouse is air tight
- Air temp should also be uniform from crop to top of roof
- Use circulating fans to equalise temperature
- Install a thermal screen if you can afford it
- Reducing air temp near the roof by one degree may lower fuel use by 10%

There is available a large range of energy saving equipment, here are a few ideas:

- Double polythene coverings wall and roof
- Thermal screens roof and walls
- Skirt propagating benches
- Installing moving benches to eliminate aisle ways and maximise crop area
- Insulating propagating benches to eliminate heat loss
- Thermally efficient heaters, gas or electric
- Hot water mats for propagating benches
- Solar hot water and greenhouse heating

We have experimented for some time with solar hot water for use in the propagating house. We have used four banks of evacuated tube solar collectors, which feed hot water into a heat bank fitted with three large copper coils. Cool water from the return end of the bench goes through the heat bank coils and then back to a mixing tank where the water, if necessary, is then brought back to the desired temperature using a gas heater. The water is then pumped through specially designed rubber matting at a slightly higher temperature than is required on the top of the bench. We believe we are saving slightly in excess of 30% of our propagating bench heating costs using this system.

Some other possibilities for heat savings involve the use of water or Trombe walls; Phase Change materials (solid to liquid) in glazing and walls and thermally efficient polyethylene covers often with special covering to improve growth rates.

These are just a few ideas that we can adopt to help us save energy, we will need to keep thinking of new ideas so that we can remain environmentally sound as an industry and continue to be competitive.