



Farm Energy IQ

Farms Today Securing Our Energy Future

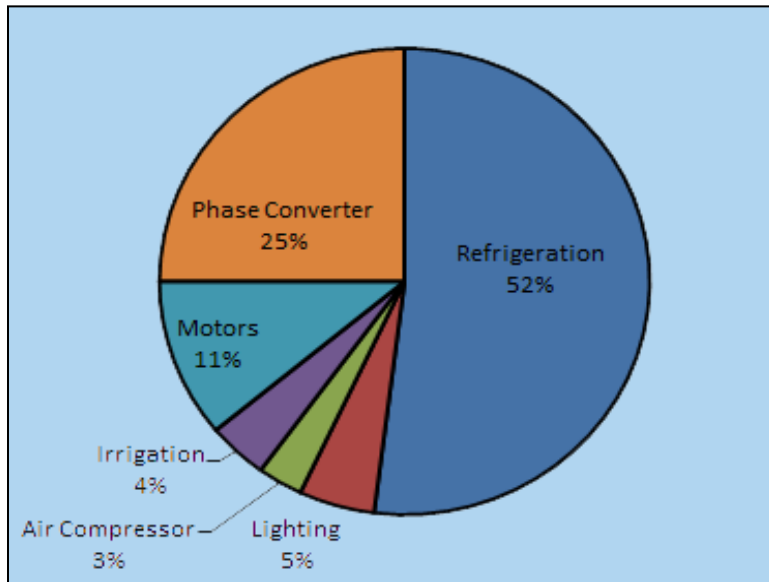
**Top 10 Ways to Save
Energy in Tree Fruit
Production**



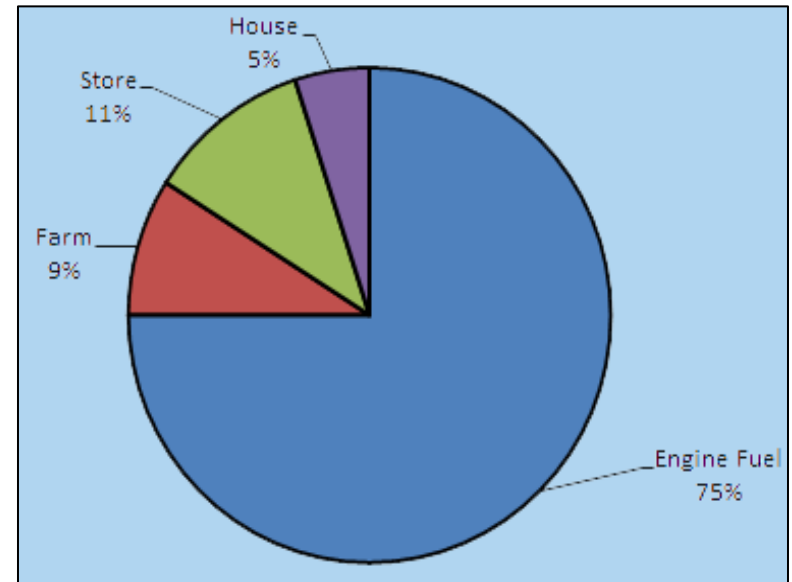
Top 10 Ways to Save Energy in Tree Fruit Production

Ryan Hilton, Daniel Ciolkosz, and Tara Baugher
Penn State Extension

Where do you use energy on your farm?



Example breakdown of annual electricity use on a fruit farm with an operating cold storage.



Breakdown of energy for all energy uses – fuel and electricity – from a Penn State Extension farm audit.



10: Irrigation: Reduce the Pressure

- Pressure can be monitored using pressure gauges.
 - It is common to have one pressure gauge at the field entrance and several more in the field.
 - Pressure gauges cost about \$15.
- Too-high pump pressure wastes water and energy.

Drip irrigation requires operating pressures between 15 to 25 psi at the pump and 10 to 12 psi at the drip tape.



9: Irrigation: Eliminate Leaks

Leaks reduce the pressure at the emitter and the volumetric flow rate to the field.



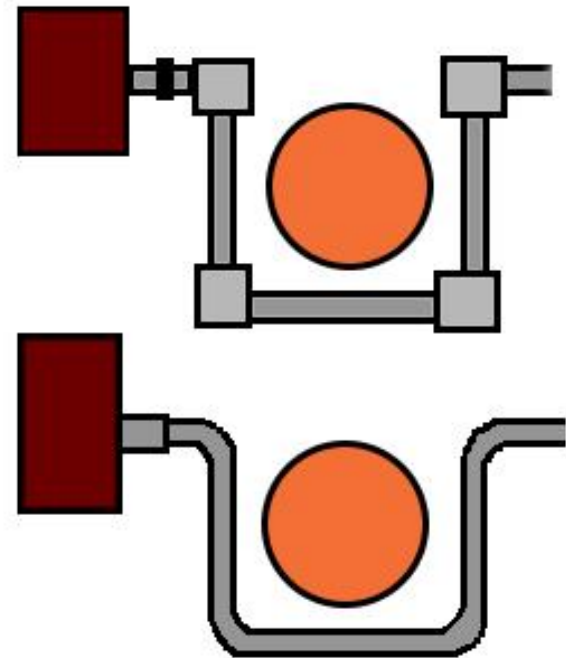
DO NOT:

- Ignore leaks.
- Increase the pump pressure.



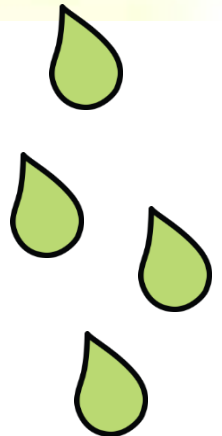
8: Irrigation: Minimize Kinks and Elbows

- Simplify your system by reducing the number of elbows, tees, valves and any other unnecessary obstructions.
- A gentle bend creates less friction than a 90-degree turn!



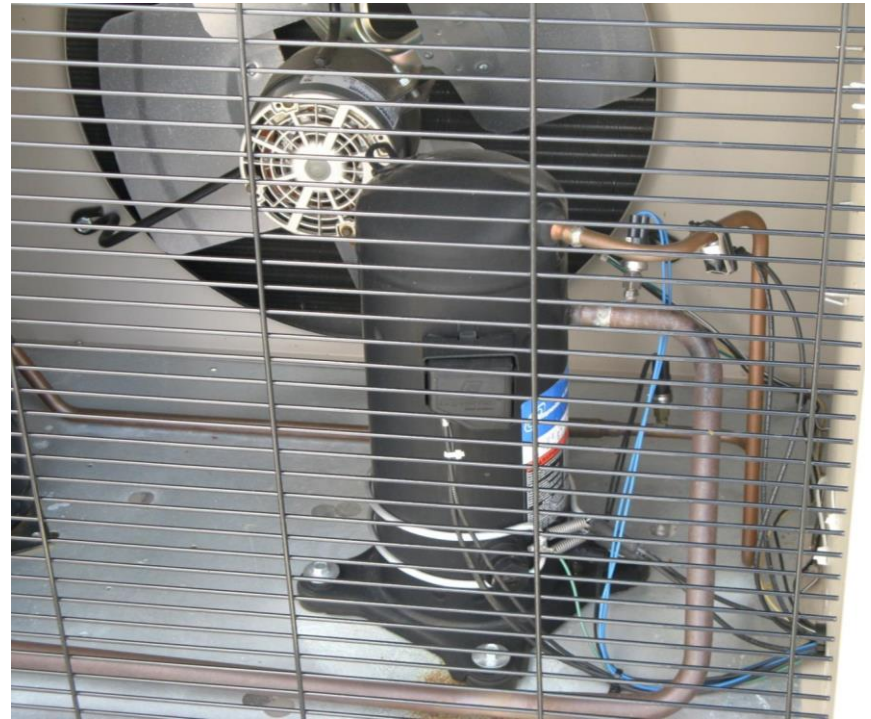
7: Irrigation: Use High Efficiency Emitters

- Drip irrigation systems use a fraction of the water compared to sprinkler and surface irrigation systems.
- Energy efficient emitters require smaller pumps.
- It is important that irrigation water is adequately filtered to avoid clogging.



6: Upgrade Refrigeration System

- Upgrade or select compressor/condenser units with energy efficient models.
- Upgrade evaporator fan motors with energy efficient models.
- Install variable frequency drives (VFD) to motors to control running time.



5: Improve Cold Room Insulation

- Doubling insulation reduces conduction heat loss by 50%.
- Condensation is a sure sign that the floor is not sufficiently insulated.



- *Plan on at least R25 insulation.*
- *Make sure there are no gaps in the insulation.*
- *Cover and protect insulation from wear and tear.*
- *Keep strip curtains in good working order.*



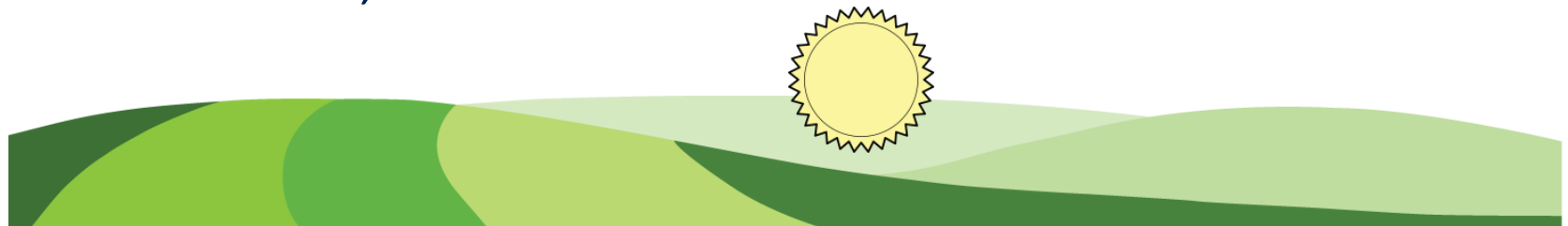
4: Tune up Your Refrigeration System

- Regularly check the “sight glass”—a clear glass lens in the line that shows the flow of refrigerant—to make sure that refrigerant pressure is adequate.
- Clean fan blades from dust and dirt build up.



3: Upgrade Your Lights

- Replace 8-ft T12 fluorescent strip light fixtures with 4-ft T8 fluorescents—retrofit kits are inexpensive.
- Electronic ballasts are more efficient and don't have the flicker and hum of magnetic ballasts.
- Replace incandescent bulbs with ENERGY STAR compact fluorescent bulbs or LEDs.
- Add occupancy sensors to low-use areas such as laundry, bathrooms, break rooms.



2: Improve Field Operations

Reduce fuel use for fleet operations:

- Tune up and maintain equipment!
- Smaller is better!
- Determine optimum field layout.
- Properly ballast tractors to control slip.
- Consider color and placement of storage tank.
- Determine optimum field layout.



1: Consider a Fruiting Wall

- A “fruiting wall,” in which more trees are planted per acre, reduces fuel costs.
- A high density orchard yields more fruit per acre and requires smaller equipment with higher fuel economies than does a conventional orchard layout.



Summary

10. Reduce Pressure in Irrigation System
9. Eliminate Leaks in Irrigation System
8. Minimize Kinks and Elbows in Irrigation System
7. Use High Efficiency Emitters in Irrigation System
6. Update Refrigeration System
5. Improve Insulation in Coolers
4. Tune up Refrigeration System
3. Upgrade Lights
2. Improve Field Operations
1. Consider a Fruiting Wall



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Questions?