ENERGY-RELATED AGRICULTURAL BEST PRACTICES

General Operations

For Vegetable Farms

Farms can use less energy, save money, and be more resilient through equipment upgrades that pay for themselves

There are several measures and technologies available to help vegetable farms reduce energy use and save money while maintaining or enhancing production. Vegetable farms include single-item farms such as onions or potatoes as well as multi-product farms growing vegetables such as tomatoes, peppers, cucumbers, cabbages, green peas, snap beans, squash, sweet corn and more. This factsheet focuses on growing and post-harvest efficiency and does not cover farm vehicles or alternative energy sources.

Relevant Measures and Potential Electric Use Reduction

Technical assistance and rebates are available to help vegetable farmers implement energy saving measures. The tables below show areas of operation where vegetable farms tend to get the most benefit from energy efficiency measures. Consider the following parts of your farm operations, and look for opportunities to improve energy efficiency, especially where equipment replacements or expansions are needed. Visit AgEnergyNY.org for more information and to connect with local expert support.

Vegetable Farms with Refrigeration and No Packing Lines	
Measure	Percent of Annual Electric Use (Range)
Lighting	10-30%
Ventilation	5-15%
Well Pumps	1-6%
Compressed Air	1-3%
Refrigeration	10-30%

Vegetable Farms with Packing Lines	
Measure	Percent of Annual Electric Use (Range)
Lighting	10-30%
Ventilation	5-15%
Well Pumps	1-6%
Compressed Air	1-6%
Line Motors	10-30%

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Energy-Saving Technologies

The following is a list of energy-efficient technologies that reduce energy use and may qualify for incentives and rebates.

Upgrades and Description	General Operational Requirements	Potential Energy Savings[1]	Typical Simple Payback[2]	Possible Barriers	Non-Energy Benefits
High-efficiency ventilation with VFDs Fan and evaporative pad systems using high-efficiency components, Variable Frequency Drives, and electronic controls for system optimization.	Average weekly use more than 20 hours.	20-80%	3-12 years	Cost; building design may limit implementation of certain items.	Improved produce quality and indoor air quality.
High-efficiency refrigeration system Well insulated, high-efficiency walk-in cooling for produce prior to distribution. Includes strip curtains, scroll compressors, brushless motors, sensors and controls.	Higher cost items require annual use of more than just a seasonal four months.	9-44%	1-9 years	Cost.	Improved produce quality and equipment longevity.
Irrigation water management Irrigation guided by moisture sensors, weather stations, and other sensors.	Targeted for high-water-need vegetables.	5-43%	4-15 years	Cost.	Decreased water consumption, decreased wear-and-tear on pumps, improved plant health.
Compressed air optimization Compressor setpoints lowered (to 90 psi, or 110 psi max), lead-lag arrangements fine-tuned, a new variable speed compressor should be installed when the base load is sufficient to warrant the expense.	For farms with compressed air needs beyond general shop uses.	5-30%	1-7 years	Cost; unique compressed air requirements.	Reduced wear and tear on the compressor.
Drip irrigation/micro irrigation Using surface drip, subsurface drip, drip drag lines, and other precision irrigation strategies.	Targeted for high-water-need vegetables.	25-75%	5-20 years	Cost; some micro irrigation options may not work with all crop types.	Decreased water consumption, decreased wear-and-tear on pumps, improved plant health.

Table Notes:

*1. The column for **Potential Energy Savings** represents the potential savings as a percentage of the total energy use for each technology category. For example, if ventilation was 10% of a farmer's electricity usage, and the table showed a Potential Energy Savings of 25%, the net effect would be a 2.5% overall electricity energy savings. A farmer can then predict **Annual Cost Savings** by estimating 2.5% off their annual bill. If that farmer's annual electricity bill is $10,000 then the potential cost savings for implementing HE ventilation would be $250 per year.*

*2. Simple Payback is the installation costs divided by the potential energy cost savings, showing how long it takes for annual cost-savings from an upgrade to pay for the initial costs. A farmer can use this information to predict the **Expected Implementation Cost** by taking the annual cost savings from note #1 and multiplying it by the Simple Payback for the technology being investigated. If the HE ventilation example had an annual cost savings of $250 and had a Typical Simple Payback of 3.0 years, then the estimated implementation cost for that upgrade would be $750.*

Resources

Energy efficiency resources are being developed for farmers by Cornell Cooperative Extension and the New York State Energy Research and Development Authority, in collaboration with topic-experts in New York State. Visit AgEnergyNY.org to find cost-saving resources for farms:

- Recommendations for energy-efficient technologies
- Conservation practices to optimize energy use
- Easy access to funding resources

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Ready to get started?

Visit AgEnergyNY.org to learn more and to get advice on energy efficiency and farm operations, learn about available grants and incentives, or obtain a free energy audit of your farm operations.

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