



MICROGRID
KNOWLEDGE

WHITE PAPER

Solving Your Energy Problems Has Never Been Easier for Agriculture and Food Processors



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Executive Summary

New onsite energy options and business models are capturing the attention of farmers, food processors and operators located throughout the food supply chain as a convergence of energy and sustainability issues pressure their profitability. Agriculture sector businesses face:

- ▶ Increased energy costs
- ▶ Decreased electric reliability
- ▶ Pressure to reduce greenhouse gas emissions
- ▶ The need for creative solutions to manage waste sustainably

This white paper from Schneider Electric and its energy-as-a-service joint venture company GreenStruxure explains how to turn those challenges into opportunities by increasing operational freedom and resilience, improving environmental sustainability and growing

profitability. We also introduce the three primary business models agricultural operations can pursue to tap the benefits of onsite energy at their sites:

- ▶ Ownership
- ▶ Leasing
- ▶ Energy-as-a-service

The agriculture sector is comprised of a diverse mix of small and large operators, but one thing they all share is the need for reliable electricity to keep intact the delicately timed balance of their operations and the greater food supply chain. Written for agricultural operations of all sizes and positions, this white paper shows why energy alternatives have captured the attention of the sector in many parts of North America.

A Downward Spiral: Energy Costs Predicted to Rise, Service Reliability to Fall

Agricultural operators in the field and food processors in the factory have more in common than their positions in the food supply chain. They share a critical dependence on electricity and electric reliability to ensure their carefully orchestrated operations remain profitable and avoid excess product waste and other costly operational challenges.

Unfortunately, the cost of electricity and electric grid services in most areas continues to go up, while reliability falters — and is likely to get worse in the future due to climate disasters ranging from wildfires to drought to intense storms.

High costs, power outages and reliability breakdowns are a big reason why agriculture and food processing operators are looking for an alternative.

Onsite microgrids are one such alternative, offering more freedom to manage energy costs and energy use. They can also enhance sustainability and operational resilience through greater electric reliability. When the main grid goes down for hours or days, microgrids can keep critical operations running so that harvests kept in cold storage do not spoil and canners are spared cleaning and resetting entire production lines to avert safety issues from food caught in equipment.

The Need for Electricity Isn't Going Anywhere

If electricity costs are expected to keep going up and electric grid reliability is expected to go down, what are agricultural operations and food processors options to break out of the harmful cycle?

Going without electricity is not an option.

Electricity has become essential to modern agriculture and food processing. If fact, the use of reliable and affordable electricity could be extended to new applications in many cases to make operations more profitable. In addition, many states and local jurisdictions are pursuing electrification as a means to reduce greenhouse gas emissions, which could result in rules and programs that further tip the scale toward electricity.

Being very energy intensive, food processor operations have more in common with oil refineries, cement plants and other industrial processes than with farms. For these operators, lowering greenhouse gas emissions and energy costs are both critical. They need a solution to achieve both at the same time, taking into account the unique energy needs of their operations.

Power also is crucial for conventional agricultural operations such as crop farms and orchards that grow, store and transport fruits and vegetables or dairy and livestock farms that produce and process milk, cheese and meat, power. [Electricity uses](#) include:

- ▶ **Inputs:** irrigation, livestock watering, pond aeration
- ▶ **Production:** electric fences, egg incubation, livestock facility ventilation, security and lighting
- ▶ **Handling and processing:** livestock processing, crop drying, grinding/milling/polishing/pressing,

pasteurizing/homogenizing/separating, cold storage, moisture control, mechanized sorting and packaging

- ▶ **Distribution:** Warehousing, material handling, retail store lighting and refrigeration

Whether an operation has high or low energy demand, its electric power must be 100% reliable. Businesses across the agriculture and food processing landscape need an affordable, reliable and sustainable electricity solution.

What Is a Microgrid?

A growing number of businesses along the food supply chain believe onsite microgrids are that solution. But there's still little understanding of what, exactly, a microgrid is.

Let us explain. A [microgrid](#) is a self-sufficient energy system that serves a discrete geographic footprint, such as a college campus, hospital complex, business center, farm or food processing plant.

But that definition only scratches the surface. Microgrids can be comprised of many things:

- ▶ Distributed energy resources including solar panels, battery storage systems, diesel generators, methane digesters and fuel cells
- ▶ EV chargers, smart HVAC units and water heaters, and other connected devices
- ▶ A centralized microgrid controller that allows the operator to coordinate the distributed energy resources, data from connected devices and oftentimes signals from the main electric grid to optimize the system

Microgrid Solutions for Agriculture and Food Processors

While a microgrid can be the combination of many things, the technologies exist today to develop microgrids specifically designed to solve the energy needs of agricultural operations, food processors and others operating in the food supply chain. For a wide range of operations, microgrids can provide four key benefits:

1. More resilient operations through increased electric reliability
2. Increased sustainability through lower greenhouse gas emissions and new uses for waste streams
3. Cost-effective and predictable energy and operational costs

4. Improved operations through electrifying formerly manual operations and scaling facilities

1 More Resilient Operations

Microgrids make operations more resilient by increasing the reliability of their energy supply.

The electric grid faces an increasing number of challenges in many regions, from extreme weather to inadequate and antiquated electric grid infrastructure to growing demand for electricity that stretches the grid's ability to serve it. Those challenges result in a less reliable grid and more and longer power outages.

Farmers and food processors in California have witnessed the fallout first hand, as public safety power shutoffs result in outages from even the threat of weather events like high winds and wildfires. For most farmers and food processors, once their season begins, they operate 24/7 for months, and every moment counts. Surprise power outages of even a couple hours can disrupt a carefully orchestrated sequence of growing, harvesting, processing, storing, transporting, jarring or canning with major cost and operational consequences.

Microgrids can step in when the grid is out to maintain critical operations, thus avoiding potentially costly product losses, decreases in the value of a product or process disruptions.

Case in point: Tomatoes

Tomatoes move from the field to the can in under six hours, with major cost implications if the process is slowed down. If a power outage strikes when tomatoes are in process, even a short delay can harm the quality of the product and its value. But even more costly, an outage of more than a few hours would result in a food safety concern that would force a canner to clean and reset its entire production line, which not only means the cost of lost product and cleaning but the cost of time it takes to get the production line ready to operate again.

Microgrids provide the resilience necessary to ensure the delicate balance for products like canned tomatoes is maintained.

Using electricity from microgrid generation resources such as solar power results in decreased emissions to power operations compared to power from the grid.

2 Increased Sustainability

Many agricultural businesses and food processors have decarbonization targets or established ESG goals related to sustainability. Onsite microgrids can be an attractive solution to meet these goals. Using electricity from microgrid generation resources such as solar power results in decreased emissions to power operations compared to power from the grid.

They offer a path to maximize onsite renewable power generation, and these renewable energy resources combined with battery storage can optimize sustainability and cost-efficiency goals. Thanks to plummeting costs and increased availability, battery storage is becoming an increasingly attractive solution to [increase flexibility](#) and resilience for business operations.

Customers also have the option to buy bundled or unbundled sustainability attributes to report sustainability achievements under market accounting standards.

3 Cost-effective and Predictable Energy and Operational Costs

While the energy and operational cost benefits of deploying a microgrid to support operations at a food processing or agricultural facility will depend on specific circumstances at each facility and the various regulations and incentives that apply in the area where the operation is located, microgrids can help cut costs in a number of ways.

- **Cost-competitive energy:** Owning a microgrid can lead to lower total costs of electricity over the system's lifetime compared to buying power from the grid. Many developers will install, own and operate a microgrid at a business' facility, and sell the energy as a service back to the business, resulting in no up-front costs and a competitive cost of electricity from Day One, with many other sustainability and resilience benefits.
- **Cost predictability:** In most areas, the price of grid power is only going up. Pursuing a microgrid now is a way to get ahead of the curve and avoid those higher costs when they arrive. Energy-as-a-service options deliver 100% stable and predictable pricing on your cost of renewable energy.
- **Avoided cost of product losses and production shutdowns:** Agricultural operations benefit economically by avoiding costs related to power outages, such as product loss, spoilage and production line disruptions that ripple through operations when processing is delayed. It's critical to accurately track the cost of disruptions to operations caused by power outages. When managers know how much power outages really cost, it informs them about how much a microgrid can save each year by preventing outages.

4 Improved Operations

Microgrids can also unlock opportunities to improve and expand operations in new ways.

For agricultural businesses that have not necessarily invested in energizing and automating processes to the same extent food processors have, lower-cost onsite energy from microgrids can make operational improvements more economic.

- Implementing electrified solutions that decarbonize transportation, handling and hoisting, and site heating needs
- Diversifying and increasing agricultural production
- Mechanizing and automating previously manual operations

- Processing raw products to add value to commodities
- Installing new or additional equipment, such as irrigation pumps, freezers, processing and packaging technology or telecommunications equipment
- Starting or scaling-up more energy-intensive but beneficial modes of operation, such as greenhouse and other forms of indoor farming

For food processors, microgrids can help scale-up operations or create modularity in production.

This might involve a solution to power individual production processes when they are time sensitive and can't be disrupted.

Key Considerations Before Making a Microgrid Decision

Today, microgrid developers can offer agricultural operators and food processors a number of contract structures to benefit from microgrids. These include ownership, leasing and energy as a service.

Ownership

If a business wants to own a microgrid at its facility or farm, the cost benefits of the system will depend on where the operation is located, the cost of grid power in the area, and incentives from state and local governments or private trade groups and organizations. Ownership offers benefits, but also carries risks related to permitting and development, staffing, repairs, maintenance and other responsibilities.

Fortunately, the falling cost of key technologies is improving the economics of ownership for small businesses. For example, the cost of solar—one of the most popular assets to add to microgrids—has fallen so much that it is now more economic than grid power, even without incentives, in some areas. Costs are also falling for battery storage, which can be paired with solar and other energy resources to meet the energy intensity requirements of larger operations.

One additional consideration is deciding who will operate the customer-owned microgrid. Energy management is not a core competency for agricultural and food processing businesses, so those that want to own a microgrid might consider hiring an energy service company to operate their system.

Leasing

Leasing a microgrid allows a business to avoid the high up-front costs of microgrid ownership while still allowing ownership in the end. Typically through a multiyear lease, a microgrid developer will design and install a microgrid and charge a regular lease payment that can often be lower than the business' electric utility bill.

Energy-as-a-service

Energy-as-a-service is a new business model that is rapidly emerging for commercial and industrial business customers. The energy-as-a-service provider manages the financing; builds, owns, operates and maintains the microgrid; and maximizes energy outcomes based on the customer's needs. This means there is no up-front capital cost for the agricultural or food processing operation. What would have been a large capital expenditure subject to depreciation over the course of years instead becomes a monthly operating expense, paid for via monthly billing that is often cheaper than existing monthly energy costs.

This model minimizes risks for agricultural operations and food processors because it shifts the risks and responsibilities of applying and qualifying for incentives, clearing permitting and other development hurdles, and operating and maintaining the system to the developer. Many providers also offer a digital platform through which you can get real-time visibility on the performance of your system, energy management and sustainability reporting, and other services.

Next Steps

The benefits of microgrids for companies up and down the food supply chain are already leading to new systems being installed at agricultural and food processing operations throughout North America. However, pursuing a microgrid is a big decision that requires research and expertise.

Choose a microgrid developer that has experience working with your sector, whether that be through developing systems for food processors and industrial facilities or working with a variety of farmers and agricultural operations.

An experienced partner will be able to assess your operations and help you identify opportunities that lead to the best solution and most positive impact on your business.

Three Steps to Get Started

- 1 Analyze and understand your energy costs and costs associated with suboptimal operational resilience.
- 2 Assess your operations and assets—including waste byproducts, available land and existing energy use—to consider what type of microgrid could result in operational synergies and “virtuous product lifecycles”
- 3 Research and reach out to trusted partners who can help you analyze and assess opportunities to deploy a microgrid that is tailored for your unique operations.

For more information, visit:

www.se.com/us/eaas

www.greenstruxure.com/