



Crushing the High Cost of Grape "Juice"

An Innovative California Vineyard Finds

Alternate Energy Technology Ripe for Picking

THE ISSUE:

Ensure power certainty while reducing energy costs.

THE SOLUTION:

A combined chilling, heating and power (CCHP) solution creates reliable, more cost-efficient power daily with the added benefit of exhaust-driven heating and cooling.



Entrance to Vineyard 29 in St. Helena.

SOLUTION SUCCESSSES:

- Offsets utility power costs
- Powered the crush process during a PG&E outage
- State's self-generation incentive program covers microturbine equipment cost
- Serves as the primary water heating and cooling source for the facility
- Displaces much higher emission utility power and traditional boilers
- Eliminates the need, cost, maintenance and pollutants of a standby generator
- State interconnection and emissions pre-certifications aid permitting process

A New Vineyard Cultivates a New Energy Attitude

Teresa Norton and Tom Paine came to Napa Valley in 1989 to retire; a dream that was quickly replaced by another when they learned their estate was prime Cabernet Sauvignon territory. Weeks later, a three-acre vineyard was underway. In 1992, *The Wine Journal* wrote of their first 250 case offering: "The wine has developed beautifully since it has been bottled, moving from very good potential to truly outstanding...A super premier release."

In 2000, Norton and Paine met Chuck and Anne McMinn, a couple whose interest in the future of Vineyard 29 (www.vineyard29.com) proved to be as serious as their own. In a most pleasant transition, the McMinn's became the new owners and immediately put the winery and cave development plans into motion. Construction was recently completed, a portion of which is a state-of-the-art energy technology system that ensures power certainty while reducing power costs.



Behind these doors a pair of Capstone C60 microturbines spin natural gas into power, heat and cold.

The Balance of Power... and Heating and Cooling

"I'm a tech guy," said McMinn. "So we've taken a lot of steps here at Vineyard 29 to automate the winery and use other technologies to make our premium Cabernet Sauvignon even better. California's power debacle – both in terms of rates and reliability – motivated us to look at power generating alternatives."

Axiom Engineers (www.axiomengineers.com) approached McMinn with an innovative concept: A new but proven energy technology that would generate power nearly seven times more cleanly than the local utility power plants.* As an added benefit, the ultra-low-emission exhaust would provide process hot water and facility heating in cooler months. The 600°F exhaust would also chill a glycol loop to 40°F for cooling via an innovative adsorption chiller – a device that creates refrigeration for process cooling using *heat* energy instead of electric energy.

The system would be driven by two Capstone C60 MicroTurbines interconnected to work in harmony with the Pacific Gas & Electric grid. As part of the statewide Self-Generation Incentive Program of the California Public Utilities Commission (www.cpuc.ca.gov), PG&E will fund 30% of the total installed cost (see www.pge.com/selfgen for details).

During normal operating hours, the microturbines would generate and load-follow the vineyard's electricity needs, bringing higher-cost utility power consumption to a trickle. During off-peak times when rates are comparable to the onsite generation cost, the system would automatically shut down. In the event of a blackout, it automatically disconnects from the grid for safety and provides standby power. When grid power is restored, the system automatically reconnects to the grid.

Net of \$120,000 provided by PG&E through the statewide Self-Generation Incentive Program, the entire system would pay for itself in energy cost savings within 3 years or less.

Fermentation: Patience for a Clean Energy Bouquet

McMinn gave Axiom the go-ahead in late 2002. Integrating all the components to work properly with each other and the needs of Vineyard 29 required diligent efforts by Axiom and the installation contractor. A big issue was regulatory paperwork. Although the Capstone C60 is certified to the state's Rule 21 grid standard, local utility people weren't familiar with it, causing delays. Code analysis and interpretation had to be provided to building and fire officials to bone up on the latest UL-listing, CARB DG certification and other equipment regulations to which the C60 is certified.

"It took more handholding than expected," said Ray Cole of Axiom. "We had to dig through pages and pages of regulations to find snippets of vital information. We now know all about the un- and mis-documented issues, so other California vineyard installations will go much faster and smoothly." Axiom is now specifying Capstone's new, more efficient, all-in-one C60-ICHP system (www.microturbine.com/technology/contact.asp).

While still tweaking the equipment during the summer of 2003, the region was hit with a blackout at the beginning of the vineyard's critical crush period. "It happened at six in the morning when nobody was there," said McMinn. "But when the foreman arrived, he saw that everything was running, thanks to our microturbines." The turbines have been spinning along ever since.

In a two-part article on cogeneration in the Nov/Dec 2003 and Jan/Feb 2004 issues of Vineyard & Winery Management (www.vwm-online.com), McMinn notes "a backup diesel generator would sit here and maybe never be used, although it would have to be run once a week just to make sure that it worked. They're heavily polluting, they're noisy. So the microturbine equipment is a much better alternative – we use it everyday."

* Per EPA test results: www.epa.gov/etv/pdfs/vrvs/O3_vr_capstone60.pdf vs. EPA utility power plant emissions data: www.epa.gov/cleanenergy/powerprofiler.htm. NOx emissions of the C60 are 0.15 lb/MWh vs. PG&E's 1.0 lb/MWh in the region (3.0 lbs/MWh is the national average). The sulfur dioxide (0.02 lb/MWh) and carbon dioxide (560 lbs/MWh) emissions of Capstone's C60-ICHP are also much lower than those of utility power plants.



- The microturbine generator for power on or beyond the grid:
- Ultra-Low Emissions
 - Air-Cooled
 - Designed for Ultra-Low Maintenance
 - One Moving Part
 - Fuel-Flexible
 - No Lubricants or Coolants

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Power when and where you need it. Clean and simple. **Now.**

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Vineyard 29's fermentation tanks hold a premium Cabernet Sauvignon

Quick Facts:

Number of Units:
2 Capstone C60s

Additional Equipment:
2 Copeland gas compressors
1 Unifin heat recovery unit
1 Nishiyodo adsorption chiller

Electrical Output:
120 kW

Thermal Output:
Up to 230 kWth
or 800,000 Btu/hr
22 tons chilling

- Installation Objectives:**
- To cleanly create power, heat and chilling onsite
 - To ensure power certainty during outages or other grid power problems
 - To reduce demand on the utility power grid
 - To serve the heating and cooling needs of the building and wine-making process
 - To achieve rapid return on investment
 - To create energy onsite with greater fuel efficiency and fewer emissions than utility sources



The next generation: C60-ICHP

Exhaust is ported into a separate heat exchanger. Capstone's latest offering integrates a very compact, higher efficiency heat exchanger atop the C60

