

California Vineyard Pilots Game-Changing Agricultural Technology with Ventev Solar Power Systems

AT A GLANCE

Client: Verizon/Hahn Family Wines

Client Goals: Gather data about soil moisture, irrigation and the weather throughout vineyards and transmit back to the vintner to adjust growing processes to produce consistently excellent grapes for winemaking.

- Conserve water and electricity
- Protect and power the gateway and other valuable equipment from harsh weather conditions
- Ensure quick, easy installation and interoperability of gateway, weather station and flowmeters
- Transmit data seamlessly to Verizon’s AgTech solution

In California, water is a precious commodity. While the state has some of the finest regions for viticulture, with unique mountains, coastline and climate, the amount of rainfall fluctuates, droughts can be frequent and costly, and farmers must go to great lengths to deliver the right amount of irrigation to their fields. For winemakers, it is imperative to manage growing conditions to harvest consistently excellent grapes for a unified crop with a dependable, high level of quality each season.

As vineyards grapple with these issues, they are looking into technological advances to help them cut costs, maximize yields and improve crop quality. Agricultural technology, or AgTech, is on the cusp of revolutionizing farming, and can be a boon to vineyards as well by leveraging the Internet of Things (IoT) to help vintners derive actionable data from sensors placed in their fields.

Hahn Family Wines recently pioneered the use of Verizon’s AgTech solution to gather information about soil conditions and the weather in their vineyards. They hoped to obtain valuable insights in real-time to help the grapes thrive under ever-changing conditions. Verizon partnered with Ventev and chose their Solar Power Systems to provide reliable power to the gateways transmitting the data from the vineyard.

Established in 1980, Hahn Family Wines is located in the Santa Lucia Highlands of Monterey County, California. This is

an area with elevations of up to 1,200 feet, soil that drains well, and moderate temperatures – a cool-climate region perfect for Pinot Noir and Chardonnay. In fact, founder Nicky Hahn was named American Wine Pioneer in 2017 by *Wine Enthusiast* magazine as a visionary who elevated Monterey County wine to new heights. Hahn is also a visionary in terms of harnessing new technologies.

“The purpose of the Hahn Vineyards project was to monitor soil moisture, irrigation, and weather, in order to manage and produce a better crop of grapes. The Ventev Solar Power System was ideal for this application because it can stay in the vineyard indefinitely.”

Jim Baker, Application Engineer, Ventev

Remote IoT Application

To initiate the pilot, the Hahn winery installed hundreds of wireless sensors throughout its 1,000-acre vineyard, buried 12 to 48 inches below the ground, to monitor soil moisture in six-acre blocks. These blocks are parcels of land that are adjacent to one another and have the same growing conditions. Multiple water flowmeters regulate water flow, and a weather



station monitors solar radiation, wind velocity, humidity, and air temperature. An IoT gateway aggregates the data from the sensors and weather station, and processes it before



transmitting the data wirelessly to Verizon's cloud-based AgTech solution. Data is then available on a dashboard that enables the growers at the Hahn vineyard to check real-time, and adjust growing processes accordingly.

In addition to conserving water by precisely monitoring and controlling the amount of water within each block, the grower is able to realize another major benefit of the IoT agricultural technology; substantial savings on the cost of electricity needed to pump the water. Pumping water through the hills of a vineyard requires a great deal of energy. With the sensors detecting where water is needed, and more importantly, where it is not, the grower is able to conserve energy as well as water.

Powering the IoT Gateway

Ventev's Solar Power System provides continuous primary power to the IoT gateways in outdoor sites with no AC power. Trenching for AC power in a remote vineyard is difficult and cost-prohibitive. The autonomous, 12VDC "MicroSolar" Power System is ideal for powering the gateway using 3W per hour or less. Ventev offers Solar Power Systems in larger output capacities for radios drawing up to 18W per hour. The Solar Power System protects and powers the gateway, operating on a

high-performance battery that charges during the day using a 24X12X2 inch solar array. Because solar power systems must use the battery continuously, the battery must recycle quickly and frequently. This frequent cycling can shorten the battery's life. Ventev's Solar Power Systems use proven, long-lasting Partial State of Charge (PSOC) lead acid batteries that do not require a full recharge after every cycle, as standard batteries do. This makes the batteries more accessible, because they take less time to charge. In case of inclement weather, the Ventev Solar Power System is designed for five days of operation without a recharge.

Ventev custom-engineered the Solar Power Systems for the deployment and delivered them fully integrated. The customer saved significant time and expense, and removed the possibility of deployment errors in the field.

Ventev recommends a once-a-year-check of the solar panel to clean it and make sure that nothing is blocking it. Other than that, the only real maintenance required for the Solar Power System is to change out the battery every two to three years.

Results

The pilot project with the Hahn Family Wines vineyard demonstrated that

the Internet of Things could be used to monitor soil moisture, irrigation, and weather to manage and produce a better crop. As a result, water is only used where it is truly needed to irrigate the grapes. Since the vineyards are on hills and the electricity to pump it is also costly, energy savings can be realized in addition to water savings.

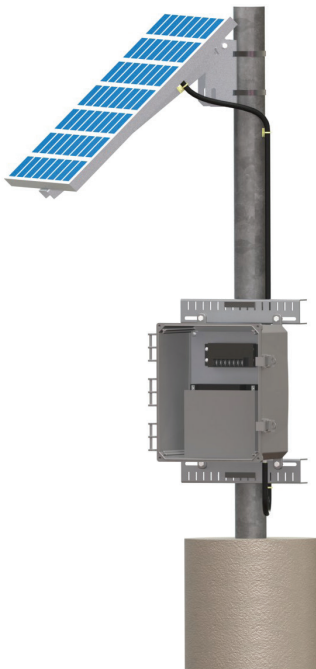
Working with Verizon, Ventev is part of a smart farming revolution that is using IoT intelligent connected devices that can simplify crop management and help farmers stay ahead of global production needs and environmental issues. This includes better water management and usage, spotting diseases and preventing them from spreading, automating cultivation, and increasing yield and quality – all solutions to help with more efficient agricultural production.

For more information, visit Ventev [Wi-Fi Solar System, Ventev.com/Infra](https://www.ventev.com/Infra)
Contact Ventev: sales@ventev.com, 800.851.4965

Sources:

- Verizon Solutions Lab website: <https://solutionslab.vzw.com/iot/agtech>
- PTC Product Lifecycle report: <https://www.ptc.com/en/product-lifecycle-report/the-internet-of-wine>
- AgTech Salinas blog: <http://agtechsalinasca.com/2017/09/29/>

MicroSolar Power System



Housed within a rugged, NEMA 4X-Rated Enclosure:

- **Multitech MultiConnect Conduit Radio** Cellular communications gateway for industrial IoT applications
- **LoRa Alliance: LPWAN** – enables diverse infrastructures, supports a wide range of interfaces and communication protocols for the flow meters.
- **Lightning Arrestor 0-6GHz** - SKU 354405, quantity 3
- **Jumper SKU 357566**, quantity 2 – 1' TWS195 NM SM connects conduit radio to lightning arrestor
- **Jumper SKU 364465**, quantity 1 – 1' TWS195 NM RPSM connects the Wi-Fi card in conduit radio to the lightning arrestor
- **Air and Moisture Vents** - SKU 393258, quantity 2 –provides ventilation for the battery during the charging cycle
- **Custom bracket** for conduit radio

Connected to the Enclosure externally:

- **Weather Station**- includes a rain collector, temperature sensor, humidity sensor, wind speed, and solar radiation sensor. Connected to the conduit radio via a RJ11 cable.
- **Flow Meter** – Wi-Fi flowmeter that measures quantities of water used per block. Controlled by software that regulates the volume of water, and ensures optimum irrigation for plants. The flowmeter is connected via Wi-Fi to the conduit radio.
- **Pole Mount Kit** - SKU 596269, quantity 1 – to mount solar panel
- **Jumper - SKU 351880**, quantity 2 - 10' TWS195 NM NF connects the lightning arrestor for the conduit radio to the antennas
- **Jumper - SKU 340416**, quantity 1 – 20' TWS400 NM NF connects Wi-Fi from conduit radio to the antenna
- **689-2700 MHz 2/4 dBi Omni Antenna** - SKU 566090, quantity 3