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—DAN CUMMINGS, CHIEF EXECUTIVE OFFICER

### Employees support it

Pastore says employees appreciate the funding from PG&E’s ADR program, remote pump control, decreased vehicle miles and ease of operation. The data telemetry and controls network allows managers to monitor equipment operations in real time. These advantages come with responsibilities, however.

“Employees understand that a more prosperous farm is good for everyone, but any time you adjust to different technology there is a learning curve,” Julia Violich comments. At Capay, employee training and ongoing checks to ensure the staff is comfortable using the technology are part of the comprehensive data-driven approach to farming.

“It’s important to remember that crop health remains our top priority,” Cummings emphasizes. “Remote soil moisture monitoring, weather analysis and DR are all pieces of a bigger picture that helps us ensure our trees remain healthy so they produce an optimal crop every season.”



### Next steps

To learn more about PG&E’s ADR program, call 1 855 866-2205 or visit [pge-adr.com](http://pge-adr.com).

### Automated Demand Response Case Study

## Reduce energy costs, keep crops healthy, and increase farm sustainability with funds from PG&E’s Automated Demand Response program

Capay Farms incorporates Automated Demand Response (ADR) program into its proprietary farm data network to ensure optimal energy use.

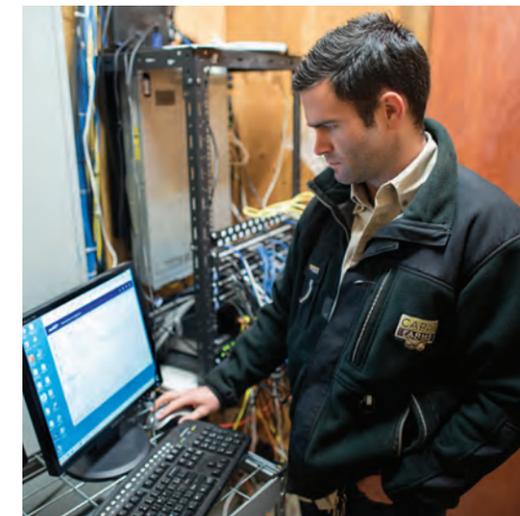
The staff at Capay Farms is responsible for more than 10,000 acres of almond and walnut production spread over 100 square miles in Glenn, Butte and Tehama counties. Headquartered in Hamilton City, the team has incorporated technical savvy, commercially available technology, and a proprietary telemetry and controls network to help them optimize operations and energy use.

In fact, Capay incorporates an advanced energy efficiency and demand management approach throughout its entire operation. As the farm’s energy consultant, Tony Pastore with AgEnergy Systems, oversees farm energy usage, energy generation, data telemetry and controls, and participation in Demand Response (DR) programs.

“With more than 10,000 acres in cultivation, our energy needs are high,” Pastore says. “This includes everything from electricity for irrigation pumping, to vehicle fuel, to natural gas and diesel for various equipment. Solar electric generation is important in the mix, too. To keep energy costs as reasonable as possible, we do two things,” he continues, “we save money [first] by reducing use and generating electricity with solar and [second], by tapping energy wisely at the correct time of day.”



From left to right: Ben Garcia, Dan Cummings, Tony Pastore, Will Martin and Chris Motta



## Growing into ADR

When electricity is used is a critical factor in managing energy costs. Participating in DR events became part of the operation at Capay.

The farm first participated in DR manually in 2009. Two years later, management became comfortable with the idea of installing remote pump controls and started to participate in DR semi-automatically by shutting pumps off remotely upon request from the utility. "Manual participation in DR required 30 minutes to an hour of field labor per pump station per event. Semi-automated participation, takes less than five minutes of labor per pump station per event," Pastore highlights.

Four years later, in 2015, Dan Cummings, chief executive officer, and Julia Violich, chief financial officer, seized an opportunity to receive ADR-incentive funding from PG&E to install remote pump controls on more pumps. ADR-enabled pump controls were added to 16 irrigation pumps ranging in size from 60 to 200 horsepower. Paul Bedard of Bedard Controls designed the ADR system. Together with Chico Electric and Capay Farms staff, Bedard completed installation of the ADR hardware and software commissioning. This investment was approximately \$97,000, including staff time. PG&E's ADR program reimbursed Capay Farms \$74,600, or 77 percent of the project cost.



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After the initial success, Capay followed up with another application for funding to automate eight more pumps. In total, to automate all 24 pumps that range in size from 30 to 200 horsepower, Capay received about \$92,000 of the project costs from PG&E’s ADR program.

Automating participation in DR fits into the data-driven farming approach at Capay. Data on pumps, irrigation system, vehicles, weather, soil moisture and other equipment can be easily collected remotely and delivered to staff to make informed decisions.

“With this custom-built network, anything with a sensor can be monitored and anything with a switch can be controlled. This is the internet of farming,” Pastore explains.

“The system has only been possible with technology partners Paul Bedard of Bedard Controls, Chris Motta of PCI Business Services and our talented farm staff, especially Will Martin,” Dan Cummings, CEO of Capay Farms adds.



## An ongoing revenue stream

Capay decided to participate in demand response through PG&E’s Capacity Bidding Program (CBP) through a PG&E-qualified aggregator, NRG Curtailment Solutions.

NRG Curtailment Solutions’ staff assists Capay with monthly nominations of load reduction for enrolled pumps. This process allows Capay to nominate higher or lower kW equipment as usage changes each month. Thus, Capay retains flexibility in irrigation operations while earning incentives from ongoing participation in the CBP DR program. The farm delivered 103 percent of committed load reduction in the 2015 DR season and 100 percent in 2016. For 24 pumps with an average combined load reduction of 544 kW or about 730 horsepower, Capay earns approximately \$18,500 in ongoing cash incentives for simply shutting pumps off for short periods a few times per year.

## Efforts add up

The expanded ADR system is part of a larger data monitoring and controls network also built by Bedard Controls, AgEnergy Systems and farm staff.

Predictive maintenance at Capay complements efforts to keep energy and operating costs in check by avoiding expensive repair periods of failed equipment. As an example, Capay uses temperature and vibration sensors on motors to predict when a pumping plant may need new bearings, a mounting adjustment, shaft alignment or other maintenance. Premium-efficiency electric motors are installed whenever possible.

### PROJECT SNAPSHOT

**Location:** Headquartered in Hamilton City, CA with operations spread over 100 square miles in Butte, Glenn and Tehama counties

**Industry:** Agriculture

**Description:** Capay Farms grows almonds and walnuts on more than 10,000 acres. The farm relies mostly on groundwater and uses micro-irrigation and sprinklers to irrigate the crops. Irrigation scheduling is informed by remote soil moisture monitoring and an Integrated Pest Management Program.

**Timeline:** Enrolled in CBP in 2009, participating manually; Capay upgraded to fully automated participation in 2015.

**PG&E Programs Used:** ADR and CBP

### RESULTS

**Number of automated pumps:** 24 pumps ranging from 30 hp to 200 hp

**Incentives:** About \$92,000 from ADR program to install remote pump controls

**Ongoing DR revenue:** About \$18,500/year from CBP participation

**Total load reduction potential for demand response:** 544 kW or ~730 hp