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The City of Delano: Small Fuel Cells Provide a Megawatt Answer

International corporations like Roll Global continually look for ways to make processing of their products sustainable and cost effective. A multi-brand corporation, their companies include Paramount Farms and Paramount Citrus, which grow and process megatons of citrus, nuts and pomegranates each year in Kern County, requiring a great deal of energy. Delivering affordable products that are healthy for the consumer and the environment leads the corporate leadership to seek ways of conserving water, energy, and materials when processing their products.

Sitting on the Board of Trustees of California Institute of Technology (Caltech) is one way Stewart Resnick, CEO Roll Global, keeps informed of the latest innovations in sustainability. Many of the Paramount processing operations employ solar technology. Eric Johnson, Vice President, of Capital Projects, who oversees the building of large-dollar projects for the corporation, investigated whether solar innovations developed at Caltech could be integrated into current operations. Johnson made a visit to Caltech and came back with the report, "Well the solar looks good. But I think we need to seriously look at an even more viable technology — fuel cells." During his visit, Johnson had discovered that fuel cells produce electricity 24/7 while solar depends on sunlight which limits its production hours. There were other intriguing features such as the footprint of fuel cell installations. A 1,000 square-foot pad of fuel cells will produce as much energy as six acres of solar panels.

How does a fuel cell work? Imagine a small device made of three layers sandwiched together, with the middle layer a ceramic square tile and the other layers made of special inks that coat the larger sides of the square. One side receives oxygen extracted by applying heat to the air we breathe. The opposite side receives hydrogen extracted from natural gas by applying water steam. The oxygen



The fuel cells located at Paramount Citrus' Halos Plant in Delano, CA.

and hydrogen meet on the middle plate creating an electro-chemical reaction which generates heat, water, a small amount of carbon dioxide, and an electric current. (The emissions may vary slightly with the fuel used to start the reaction or the materials used to create the fuel cell. In this case the emissions include carbon dioxide). The water is released as steam, which is then used to continue the cycle of producing hydrogen from natural gas. The heat is captured to produce more oxygen, while the small amounts of carbon dioxide are released. The electric current is used as power. Fuel cells do not require any fuel combustion, eliminating air-borne particulates. One small fuel cell produces 25 watts. To increase the output of power, fuel cells are stacked with metal interconnector plates. A stack of fuel cells can produce 1 kW, several stacks form modules that produce 25kW, and putting the modules together creates a system that produces 100 kW. The nature of the system allows a company to add modules until the system generates the power necessary for its operations.

When Johnson was investigating fuel cells for Roll Global, Paramount Citrus was making plans to build its Halos' processing plant. The plant is designed to process and pack 25 million 30-pound cartons of Halos brand of clementine citrus each year between October and April. The design team realized that not only are fuel cells a clean way of producing energy, but cost efficient natural gas



This program is funded by California utility customers and administered by PG&E, Southern California Edison (SCE) and Southern California Gas Company under the auspices of the California Public Utilities Commission. Program services and benefits are offered on a first-come, first-served basis until December 15, 2014 or until program funds are spent, whichever comes first.

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was readily available not only at their two plants in Delano but also at five other locations including the corporate headquarters. Once they were able to determine fuel cell generation would be a financial asset to their sustainable energy strategy, they ordered patented technology Energy Server™ solid oxide fuel cell systems from Bloom Energy.

The projects benefitted from financial incentives and energy savings that will allow the systems to pay for themselves in about 6.5 years. The United States Department of Energy provided a 30 percent tax credit for fuel cell system installed costs. The California Public Utilities Commission operates the self-generation incentive program (SGIP) which provided these projects a rebate of \$2,700/KW produced. The company was also able to take advantage of a 5-year bonus on depreciation. Fuel-cell generated clean energy offers a reduced carbon footprint and provides alternative energy production to an ever growing demand as our population increases. This brought the project cost from over \$41 million to just over \$16 million with 20 year energy savings projected to reach over \$63 million.

With the ability for a company to produce sustainable energy, you may wonder “Why not generate more?” For utility customers who install their own power-generating systems, the SGIP (other self-generation programs are available), offers incentives for up to 3 MW of power-generating capacity per site. Additionally, the customer may generate and offset no more than their own average annual energy usage.

Seasonal energy customers like Roll Global typically “right-size” their self-generation systems. The company installs a system with the capacity based on their annual usage, the “right size” for the company. During the off-season, excess energy produced is banked with the utility as a credit. The company can draw on that energy credit during harvest season when they use a lot more power.

Johnson and the leadership team at Roll Global will tell you they wish they had started installing fuel cell systems sooner as they provide a 1 megawatt answer to the question of how to produce healthy food products with clean energy at an affordable cost.

Combined Energy Savings of all 7 Fuel Cell Locations

Estimated Energy Savings

Original Cost:	\$41,412,164
Incentives Received:	\$25,297,980
Net Investment:	\$16,114,184
Savings after 5 Years:	\$10,118,275
Projected Savings after 20 Years:	\$63,256,916
Payback:	6.5 Years



To learn more about the SGIP visit www.cpuc.ca.gov and search on “SGIP”.

To learn more about fuel cells, visit <http://energy.gov/eere/fuelcells/fuel-cell-systems>



Here's how to get your Kern Energy Watch advantage: Visit www.kernenergywatch.com



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