



# F-D-S Manufacturing Company

## 390-KW CHP System



### Quick Facts

**LOCATION:** Pomona, CA

**MARKET SECTOR:** Paper and Plastics Manufacturing

**FACILITY SIZE:** 240,000 square feet

**FACILITY PEAK LOAD:** 2 MW

**EQUIPMENT:** 390 kW (six Capstone C65 microturbines), two Sigma Energy heat exchangers, Thermax LT10C absorption chiller

**FUEL:** Natural gas

**USE OF THERMAL ENERGY:** Plastics drying and chilled water to cool the plastic.

**CHP TOTAL EFFICIENCY:** 80%

**ENVIRONMENTAL BENEFITS:** Facility produces 135 kg/MWh net CO<sub>2</sub> less than the utility grid (31.4% reduction in carbon footprint)

**TOTAL PROJECT COST:** \$1.5 million

**REBATES:** \$283,000 (from California's SGIP Program)

**ANNUAL ENERGY SAVINGS:** \$420,000

**PAYBACK:** 3 years

**CHP IN OPERATION SINCE:** 2009

### Site Description

F-D-S Manufacturing Company is a family-owned, West Coast manufacturer of Industrial and Agricultural Packaging with a 240,000 square foot manufacturing facility in Pomona, CA and a 100,000 square foot warehousing facility in Fowler, CA. They produce high quality and eco-friendly standard and custom packaging. F-D-S uses extrusion, thermoforming, injection molding and unique paper converting processes to manufacture recyclable polyethylene terephthalate (PET) clamshells and fruit trays and PET rolls.

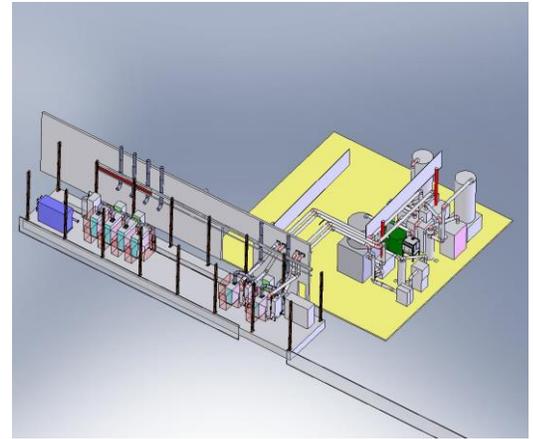
### Reasons for Combined Heat and Power

F-D-S chose to develop a Combined Heat and Power (CHP) system for three main reasons: energy reliability, cost savings, and pollution reduction. In 2000-2001, California experienced a series of rolling brownouts that caused many residents and businesses to suffer large financial losses. According to Kevin Stevenson, F-D-S Vice President of Engineering, the need for a reliable, cleaner power source that could operate even during brownouts launched their CHP search. "We were evaluating ways to increase our power supply and realized CHP would allow us to fend for ourselves when California brownouts strike," he said. After a widespread search, a system comprised of six Capstone microturbines, two Sigma Energy heat exchangers, and a Thermax absorption chiller was selected to meet the facility's forecasted combined heating and power needs. F-D-S uses 100% of the clean electricity and thermal energy generated by the CHP system for their manufacturing processes at the Pomona facility.

## Combined Heat and Power Equipment & Operation

In 2009, F-D-S installed a new plastics extruder line that required large amounts of electricity, hot air, and cold water. To support this process, they procured a CHP system to replace their old piston type chilling equipment and two natural gas-fueled dryers. While the CHP system generates onsite electricity to operate manufacturing equipment, the microturbines' exhaust gas is used for plastics drying to maximize heat recovery and utilization.

Prior to the plastic extrusion process, recyclable plastic is dried using diluted air heated by the exhaust from two microturbines operated in heat recovery bypass mode and connected to two Sigma Energy air-to-air heat exchangers. The four remaining microturbines are plumbed in parallel and operated in full heat recovery mode to produce 198°F hot water via a heat exchanger. The hot water is then pumped to the Thermax absorption chiller to produce chilled water that cools the plastics during the extrusion process while the exhaust gas leaving the four microturbines' heat exchangers is used to further dry the plastics. Due to its sophistication, this CHP system is covered by a maintenance plan that includes quarterly check-ups to ensure that all of the equipment is running at an optimal level.



The system generates 320kW of electricity on average and supports roughly 20 percent of the site's average electric demand, saving F-D-S an estimated \$35,000 per month – a 1/6 reduction of the facility's energy costs. An added benefit is that all of the thermal energy created by the CHP system is used to dry plastics and increases the overall system efficiency to 80%.

### Lessons To Share

- The process of incorporating a CHP system at F-D-S required the company to design all of the inter-system process integration engineering itself. F-D-S learned a lot as the CHP system, pressurized hot water system, and air-to-air heat exchangers needed to be in tune to ensure consistent water flow, heat transfer, and properly regulated temperatures to operate their manufacturing processes.
- Sites expecting to export power to the grid may need to consider early engagement with their local utility to fully understand all the interconnection issues and costs.
- Potential CHP adopters should engage with equipment vendors and their regional Combined Heat and Power Technical Assistance Partnership (CHP TAP) to collect valuable information to help educate policy makers on CHP technology options. F-D-S worked closely with the City of Pomona and their CHP equipment vendor (Regatta Solutions) to educate the City on the installation and operations of the system due to its unfamiliarity with combined heat and power technologies.

*“Ultimately, our CHP system makes us more competitive and conscious of the environment. The system is a great sales tool and resource that supports our intent to be a green manufacturer.”*

*- Kevin Stevenson, VP of Engineering*

### For More Information

#### U.S. DOE PACIFIC CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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#### More CHP Project Profiles:

[www.pacificCHPTAP.org](http://www.pacificCHPTAP.org)

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