



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Pacific Coast Producers

2.5 MW Backpressure Steam Turbine CHP



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Quick Facts

LOCATION: Woodland, California
MARKET SECTOR: Food Processing
FACILITY SIZE: 500,000 sq. ft. Processing Plant
PEAK LOAD: 6.8 megawatts (MW)
EQUIPMENT: One steam boiler (180,000 lb/hr, 400-psig) and one 2.5 MW back-pressure steam turbine generator with an exhaust pressure of 35-psig.
FUEL: Natural gas
USE OF THERMAL ENERGY: Tomato processing
CHP TOTAL EFFICIENCY (HHV): 80%
ECONOMICS: Capital Cost net incentives - \$3.5 million; Annual Cost Savings - \$600,000
ENVIRONMENTAL BENEFITS: NO_x emissions less than 5 ppm
CHP OPERATIONAL HISTORY: CHP system commissioned in 2019

Site Description

Pacific Coast Producers (PCP) is an Agricultural Cooperative, owned by 158 family-farms located in Central and Northern California. Since 1971, PCP specialized in canning fruits and tomatoes for private brands throughout the world. PCP products are supplied to over 95,000 grocery stores and 1.5 million foodservice outlets including hotels, schools, restaurants, prisons and hospitals.

PCP's Woodland plant produces some 250 retail and foodservice tomato products, from whole tomatoes to diced, sliced, crushed and stewed, to sauces and paste. When operating, the plant uses near 300,000 pounds per hour steam and in excess of 6 MW electricity. The Woodland plant processing season is around eighty days long and typically spans the months of July, August and September.

Reasons for CHP

PCP is committed to sustainability with numerous initiatives to improve water efficiency, reduce waste and save energy. The Woodland plant has focused on sustainability by reducing water use, and recycling byproducts from the operation. This facility is currently focusing on reducing greenhouse gases and energy efficiency, to continue its path toward a sustainable future.

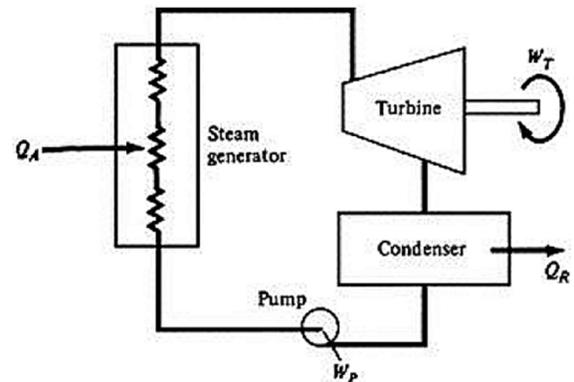
The large coincident thermal and electric loads make PCP Woodland a good candidate for Combined Heat and Power (CHP) but was challenged by the short operating season. The relatively high steam-to-electric demand ratio at the Woodland plant makes it a good fit for a steam turbine topping cycle.

CHP Equipment

PCP chose a topping cycle steam turbine CHP system for their Woodland plant. A Babcock & Wilcox 180,000 pound per hour, 400 psig saturated steam boiler was procured. The boiler was upfitted with a Selective Catalytic Reactor (SCR) to meet the NOx requirements of the Yolo-Solana Air Quality Management District. The boiler was paired with a 2.56 MW Elliott back-pressure steam turbine generator, exhausting steam at 35 psig.

The CHP system along with a new 150 psig, 5 ppm NOx Cleaver Brooks boiler enabled the retirement of three older boilers. The CHP system plus two of the remaining three boilers provide all of the plant's steam needs. A third boiler serves as backup to ensure adequate and uninterrupted steam supply during the processing season. Collectively, the CHP system and boilers serve various processes and mechanical drive equipment at pressures varying between 15 psig and 150 psig.

The steam generator is connected to the PG&E grid at 12 kV. The plant has not experienced any long-duration power outages in recent years and is exempt from Public Service Power Shutdowns because they share an electrical circuit with essential service customers. The plant, however, experienced frequent brief voltage dips and occasional multi-second interruptions which often trips motor driven pumps and compressors off-line. Capacitors have been installed to override the voltage sags. A short duration 3 MW battery is planned to remedy future multi-second outages.



Back-pressure Steam Turbine Schematic

CHP Operation

The CHP system is owned by PCP and is operated by PCP staff. Major maintenance is conducted by outside vendors. The CHP system operates 24/7 during the approximate 80-day processing window which overlaps with PG&E's high-priced summer billing rates. As the annual economics are determined during this short operating window, it is imperative that the CHP plant operate at or near 100% availability. All annual maintenance is conducted prior to the processing season to ensure high CHP system uptime during the processing window.

"The CHP system complements a host of other energy efficiency, recycling and water conservation measures implemented at the Woodland plant which are ongoing steps toward a sustainable future."

**Erick Watkins, Director of Engineering,
Pacific Coast Producers**

Key Takeaways

- The economics of a CHP system with a short annual operating season were achieved by 1) prudent capital cost budgeting and in-house project management; 2) high overall efficiency of the CHP system; 3) an attractive natural gas transportation tariff for CHP systems; and 4) attention to system upkeep for high availability during the operating period.
- PG&E initially denied the plant's Permit to Operate (PTO) Interconnection due to an antiquated rule specifying a power meter no longer in production. PCP appealed to the CPUC resulting in PG&E granting a Temporary PTO which enabled operation of the CHP until August 2021 when the PTO was granted.
- Although the plant and the CHP system only operate 3 months each year, PG&E still required payment for standby service year-round. However, the questionable fees did not deter the project from moving forward.

For More Information

U.S. DOE WESTERN CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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