



# Indianapolis Gatorade Facility

## 3.6 MW CHP System

### Background

The Indianapolis Gatorade facility is one of eight Gatorade manufacturing facilities in the PepsiCo Beverages North America's (PBNA) U.S. operations. The facility is capable of producing all Gatorade flavors in all available bottle sizes. The Gatorade production process requires a very high thermal demand for both steam and hot water. The manufacturing facility uses approximately 254,000 MMBtu/yr. or an average of 29 MMBtu/hr. Prior to installing the Combined Heat and Power (CHP) system, the thermal requirements of the manufacturing facility were provided by four natural gas fueled boilers totaling approximately 2,800 HP (93.7 MMBtu/hr.). On the electric side, the facility consumes approximately 24,500,000 kWh/yr., provided by Indianapolis Power and Light (IPL).

### Quick Facts

**Location:** Indianapolis, Indiana

**Market Sector:** Industrial, Beverage Manufacturing

**CHP Generation Capacity:** Total 3.6 MW

**Prime Mover:** Three Caterpillar 1.2 MW engine/generator sets

**CHP Fuel Source:** Natural gas

**CHP Heat Recovery:**

– 2,100 lbs/hr of 115psi steam

– 225 gpm of 190°F hot water

**Total CHP System Cost:** \$6M (including new utility building housing CHP system)

**Projected Simple Payback:** 6 years

**Began Operation:** January 1, 2019

**Annual Emissions Saved:** 10,770 MT of CO<sub>2e</sub>  
(equivalent to 23,589,220 lbs.)

### CHP Drivers

Technology	GHG Cost Efficiency (\$/MTCO <sub>2e</sub> )
Improve existing <sup>1</sup>	\$600-\$1,000
Cogen	\$450-600
Solar PV	\$2,000
LEDs	\$900
Condensing economizer	\$700

1. VFDs, line controls, regen, compressed air optimization, dew point controls, refrigeration optimization, HVAC, orifice steam traps

Source: PepsiCo 2/19/19 Presentation by Lempera to Midwest Cogen Association.

PepsiCo's environmental sustainability goals include improving water use efficiency by 25% by 2025 and reducing greenhouse gas (GHG) emissions by 40% by 2030.

In 2017, PBNA initiated a project at its Indianapolis, Indiana Gatorade manufacturing facility aimed at lowering its overall utility costs while substantially reducing its carbon footprint. The project team analyzed several technology options (see table inset) and concluded that one of the most cost-efficient approaches (\$/MTCO<sub>2e</sub> removed) to meeting their project goals was the use of CHP. The facility has very favorable CHP characteristics; long operating hours (3 shifts/day, 7 days/week), a manufacturing process with high thermal requirements, and favorable electric and gas rates (at the time of the project initiation).

### Project Description

PepsiCo's corporate Sustainability Engineering Group partnered with MacAllister Power Systems (a total solutions provider for Caterpillar electric power and industrial engines) to design and install the CHP system, and with Thermal Energy Inc. to assist in the design and installation of the heat recovery and thermal distribution system.

The \$6,000,000 project included three 1,700 HP natural gas fueled Caterpillar reciprocating engine/generator sets, each



Engine/Generator Room: Source PepsiCo

capable of producing up to 1.2 MW of utility grade electric power. The system, which is connected to IPL's electric grid, is designed to not back feed electricity onto the grid. Using sophisticated controls, the CHP system operates in an electric load following mode, providing a full range of continuous power from approximately 600 kW to 3.6 MW. The system is capable of providing approximately 90% of the facility's electric load with all manufacturing lines operating at full capacity during the summer peak electric load season.



Heat Recovery Steam Generator (HRSG): Source – PepsiCo

The project included converting one of the four existing natural gas boilers into a Heat Recovery Steam Generator (HRSG). The 900°F engine exhaust from the three engines is directed into the HRSG, producing up to 2,100 lbs/hr of 115 psi steam for the Gatorade production process. The heat recovered from the engine jacket water used to cool the engines produces up to 225 gallons-per-minute (gpm) of 190°F hot water. Finally, to get the maximum thermal efficiency from the system, heat is also recovered from the HRSG's condensing economizer to produce hot water. Operating at full capacity, the CHP heat recovery system can provide approximately 13.5 MMBtu/hr of useful thermal energy to the manufacturing process (roughly 46.5% of the facility's average thermal requirement). When operating at full capacity, the CHP system reaches a system efficiency of 85%.

## Results and Lessons Learned

- **System Performance:** In 2020, the CHP system produced 22,779,750 kWh, providing approximately 93% of the facility's annual electric load. Each engine/generator set operated at an availability factor of over 90%.
- **Impact on PepsiCo Corporate Sustainability Goals:** The 10,770 MT of CO<sub>2</sub>e removed annually by this single project represents a 36% annual reduction in CO<sub>2</sub>e at the Indiana facility, and contributes a 6.5% reduction in the 2030 GHG corporate goal.
- **Changing Utility Rates:** IPL changed its rate structure after the initiation of this project by shifting more of the cost onto the demand charge (\$24.83/kW/mo., increased from \$12/kW/mo. both with an 11 month ratchet clause). This unexpected shift in rate structure has resulted in an approximate 50% reduction in the estimated annual savings (from \$1M to \$500k/yr.). For future CHP projects, the issue of shifting utility rates should be addressed prior to project commitment, possibly using long-term energy purchase agreements.
- **Early Electric and Gas Utility Interactions:** It is important to notify local electric and gas utilities of project plans as early in the process as possible. Identifying any potential electric grid interconnect issues, any need for increased natural gas capacity or delivered pressures, as well as protecting against potential rate structure changes can help assure the project stays on schedule and within budget.
- **Project Awards:** The CHP Project at the PBNA Indianapolis Gatorade manufacturing facility was one of the recipients of the 2020 U.S. Department of Energy "Better Project and Practice Award."

"Utilizing CHP within several of our manufacturing facilities is a key element of PepsiCo's commitment to sustainability. It improves our energy efficiency, reduces our carbon footprint, and reduces our overall utility costs. The Indianapolis Gatorade manufacturing facility is our latest CHP project venture."

*Andy Lempera: PepsiCo Sustainability Director  
PepsiCo Beverages North America*

## For More Information

U.S. DOE Midwest CHP Technical Assistance Partnership  
[www.mwchptap.org](http://www.mwchptap.org)

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