



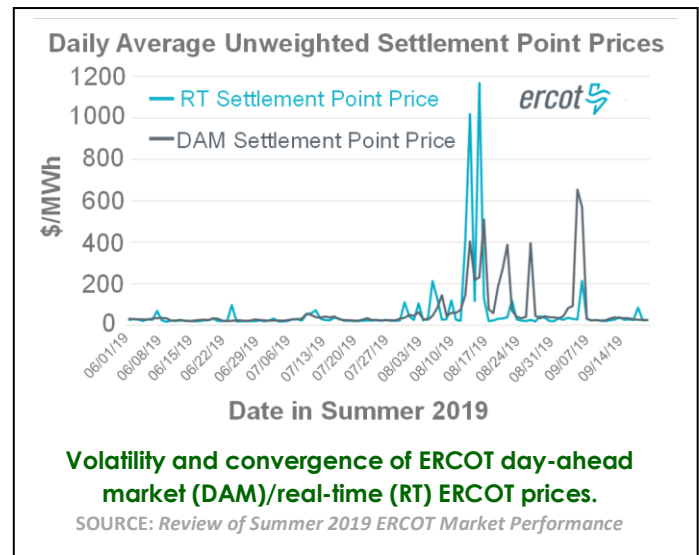
Optimizing Power Pricing Strategies and Reliability

Opportunities for CHP Operators in Texas

Program Description

As warmer-than-average temperatures lingered across Texas in August 2019, energy demand surged to record levels, driving the spare capacity of the Texas power grid below 2,300 MW. On August 13, 2019, the Electric Reliability Council of Texas (ERCOT) declared its first energy emergency alert (EEA1) since 2014, and electricity prices skyrocketed from \$19 to \$9,000 per MWh, signaling that residents and businesses could be vulnerable to blackouts and subject to volatile market prices.

Together with practical energy management and pricing strategies, combined heat and power (CHP) systems enable stable, predictable rates during times of emergency and market volatility, such as those experienced during the summer of 2019. Participation in electrical grid curtailment, load management, and other market programs can also produce significant savings and sources of revenue. The case studies below demonstrate how operators serving different types of facilities in a volatile, deregulated electricity market used CHP to ensure reliability, stabilize power prices, and achieve financial benefits.



Ensuring Reliability of Essential Systems: Texas Medical Center and TECO

Thermal Energy Corporation (TECO) provides an uninterrupted supply of chilled water and steam to all 50 buildings in the distribution system across the 23.7-million-square-foot Texas Medical Center campus. During the 2019 EEA1, TECO's 48 MW CHP system met 100% of peak power requirements for its chillers and exported the excess power to the ERCOT grid.

- TECO's primary goal is system reliability. Its CHP system was designed to produce enough power to meet the peak chilled water requirements for Texas Medical Center institutions.
- During natural disaster events, such as Hurricane Harvey, TECO will start up the CHP plant when the ERCOT grid is at a high risk of interruptions, ensuring chilled water and steam service to the Texas Medical Center is not interrupted.
- TECO operates the CHP system for an average of 1,500 hours per year. CHP is used only when ERCOT's supply and transmission systems are at an increased risk of interruption. Since going live commercially in 2010, the TECO system has generated approximately 700,000 MWh of power.



TECO district energy plant.

SOURCE: TECO

Successfully Managing Price Risk: Rice University District Energy System

The 7.4 MW CHP campus district energy system at Rice University meets nearly all thermal energy needs for 50 buildings and generates 25% of Rice's electricity and 20% of the domestic hot water. Since 2012, Rice has participated in grid curtailment

programs and provides emergency response services (ERS) to ERCOT. By maximizing benefits of multiple pricing strategies, the CHP system at Rice generates approximately \$500,000 in additional annual revenue and cost savings.

Voluntary Load Management:

- For the power needs not met by its CHP system, Rice purchases a block of electricity at hourly settlements.
- When grid power prices rise enough so that the university can reduce costs by producing its own power and curtailing load, Rice will increase output of its 4 MW solar turbine by 0.2 MW, bring its older 3.5 MW Ralston CHP generator online, and implement load management practices, including shutting off outside air to buildings.
- The curtailment strategy provides Rice with an additional 6–7 MW. The university can then release any unused power back to the grid for significant cost savings.



Rice University CHP plant.

SOURCE: Rice University

Emergency Load Management:

- Rice participates in ERS through a qualified scheduling entity, making CHP available to reduce load during a grid emergency (within 30 minutes of notification). ERCOT procures ERS resources three times annually for four-month contracts, evaluating proposals for price offerings for each time period within the contract term.
- During summer months, Rice participates in CenterPoint Energy's Commercial Load Management program, which pays up to \$31.50 per kW of verified curtailed load each year. To participate, a customer equipped with an interval data recorder (IDR) or smart meter commits to shedding at least 100 kW within 30 minutes of notification. The commitment applies to two test events and up to four unscheduled emergency events. Resources already contracted for ERS are ineligible.

Lessons To Share

- In Texas' deregulated market, when the power grid is operating normally, electricity prices are usually low, and it is typically more economic to buy power from the grid than to produce excess power from a CHP system.¹
- Contracting power at hourly settlements allows CHP operators to be price-responsive. Running CHP when grid prices are high allows operators to curtail and sell back unused grid power that was already contracted or export excess power produced from the CHP system to the grid.
- If the CHP system allows, operators can be incentivized to participate in utility load management programs and emergency response grid services.
- Understanding and transparency of grid pricing are needed for developing a CHP ramp-up and ramp-down strategy.
- Attempting to reduce electricity consumption during any of the four 15-minute coincident peak (4CP) periods is a best practice among large electric load organizations with IDR meters. Successful 4CP programs² increase market awareness and produce significant savings on the following year's demand charges.

For More Information

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¹ The CHP system remains thermal-following and does not produce excess power to offset purchased grid power.

² <https://www.nrg.com/insights/energy-education/how-texas-businesses-can-reduce-their-demand-charges-through-4cp.html>