Power for the People

Giant Battery System, Ingenuity Create Reliable Power in Remote Locale

When the sun beats down on Presidio, Texas, the temperature can hit 120 degrees. Hot winds drive gritty dust, and electrical storms send lightning cracking across the open sky. For years, residents suffered frequent power outages and fluctuations. The lone transmission line serving Presidio, just across the Rio Grande from Mexico, is a weak 69-kV line, 60 miles long, at the tail end of the U.S. electrical power grid and more than 50 years old.

Extreme Conditions Present Challenge
Electric Transmission Texas, LLC (ETT), a joint venture between subsidiaries of American Electric Power and MidAmerican Energy Holding Co., wanted to install an innovative energy storage system that would relieve the power problems in Presidio, in advance of a planned new transmission line and in the future.

The 4-megawatt sodium-sulfur battery system ETT planned to install is one of only a few of its kind in the U.S. and the largest to date — 80 modules weighing 8,000 pounds each. The system isn’t designed to operate at temperatures higher than 100 degrees. Because it also produces heat, it’s usually operated outside.

That just wouldn’t work in Presidio’s summer heat and wind-blown dust.

So ETT and Burns & McDonnell set out to do something that had never been done — build a warehouse-sized building to protect the battery system and its sensitive controls, connected to a unique substation that could provide transmission backup power and switch between power from the 69-kV U.S. grid and the 12-kV power supplied by Mexico’s Comisión Federal de Electridad (CFE).

Innovative HVAC Reduces Power Drain
Burns & McDonnell identified the temperature requirements of each segment of the battery system and designed a sophisticated ventilation system to control internal heat. Certain equipment was placed in cabinets, with temperature-sensitive sensors activating air-conditioning vents directed at critical components. The customized HVAC and other efficiency measures trimmed the facility’s energy consumption to an acceptable level.

But the structure was just one of the project’s challenges. Early calculations showed that if a traditional heating, ventilation and air conditioning (HVAC) system sufficient to keep the building temperature below 100 degrees were implemented, the facility itself would consume a large portion of the stored power — an amount equal to a quarter of Presidio’s total consumption. This called for some creative problem solving.

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Specialized Switching System
The battery-storage facility is within a half mile of a middle school, so it was important to control noise pollution. Sound-absorbing acoustic features muffle the power-conversion system’s noisy inverters.

The electrical system designed by Burns & McDonnell allows Presidio to quickly switch between power from the Mexican or the American side of the border — a manual process that used to take hours. It shouldn’t need to do that often. With up to eight hours of stored power available, the battery system protects Presidio from both the annoying flickers and brownouts that disrupted electronics and the excruciating effects of prolonged outages in the summer heat. In an emergency that produces a prolonged outage or during planned upgrades, the system can draw power from the Mexican side without damaging either side’s equipment.

Excellence Award
Despite the challenges, the building and substation were completed on a tight schedule and under budget. The energy-storage project in Presidio was awarded a gold medal for best energy project in the Texas Engineering Council’s 2011 Engineering Excellence Awards competition.

“I was truly impressed by the teamwork across our companies that realized this success,” wrote Calvin Crowder, president, ETT. “Each of you can take a moment ... to pat yourselves on the back.”

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