

Case Study

Cross Texas Transmission (CTT) & General Cable



Cooperation, Commitment and Communication Successfully Bring Wind Power to Millions in Lone Star State

One of the challenges in moving towards renewable energy is that wind farm developers are reluctant to build where transmission lines do not exist and utilities are reluctant to install transmission lines where power generation does not exist. Consequently, renewable energy initiatives require a continued investment in transmission infrastructure coupled with substantial cooperation among experienced industry stakeholders. That's how Great Southwestern Construction Inc. (Great Southwestern), a subsidiary of MYR Group Inc. (MYR Group), successfully constructed 235 miles of transmission lines to move wind-generated electricity from the resource-rich Texas Panhandle to millions across the Lone Star State.

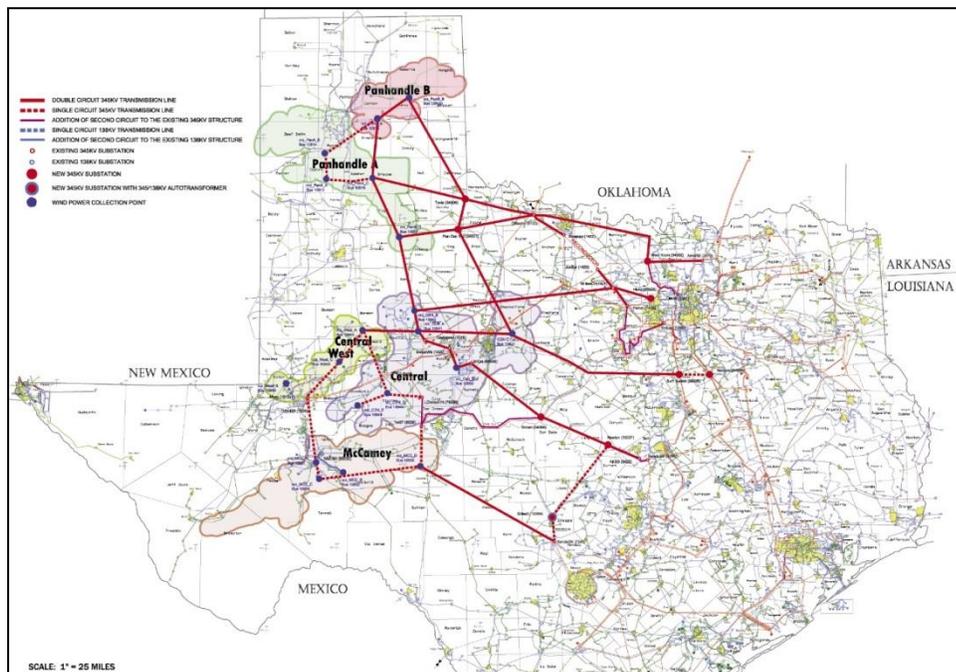
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A two-year \$217 million portion of a four-year \$425 million Cross Texas Transmission (CTT) project, the transmission lines are now commissioned as an esteemed example of modernizing the electrical grid to deliver renewable wind power. Designed to lower total cost of ownership, the sizeable project was completed on time and within budget through strategic partnerships built on cooperation, commitment and communication.

Cooperating in the Zone

CTT, an affiliate of LS Power, was designated by the Public Utility Commission of Texas (PUCT) to construct, operate and maintain the 235 miles of transmission lines as part of the PUCT's \$4.9 billion commitment to deliver renewable energy from Competitive Renewable-Energy Zones (CREZ). These zones, located in West Texas and the Texas Panhandle, are resource-rich, high wind areas. The CREZ projects were ultimately constructed by 11 different utilities to transmit 18,456 megawatts of wind power over more than 2,300 miles of transmission lines from the zones to approximately five million homes and businesses.



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The CTT portion of the CREZ initiative consisted of 1,400 structures that included lattice and monopole steel towers ranging from 100 to 200 feet tall. The 235 miles of transmission lines consisted of double-circuit 345 kVAC lines running in three segments, totaling 2,820 conductor miles.



One of the first strategic partnerships for the project originated when CTT selected the Houston Regional Office of Burns & McDonnell as the project engineering firm responsible for the design of the transmission system and associated substations, as well as for providing support for the procurement and bidding process.

“The primary challenges we faced with a project of this size and scope was selecting the best routes for the transmission lines and engineering around obstacles such as irrigation system and long spans of canyon and river crossings,” says Don Cannon, project manager with Burns & McDonnell.

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To address higher electrical loads, CTT and other utilities involved in the CREZ initiative selected Aluminum Conductor Steel Supported (ACSS) overhead conductor rather than the Aluminum Conductor Steel Reinforced (ACSR) conductor defined during initial studies. ACSS conductors can operate continuously at higher temperatures than ACSR, which enables increased current carrying capacity (Read more about ACSS at end of case study).

“While in use for several decades, ACSS has become more common today in re-conductoring to provide a greater cushion for overloading,” says Cannon “The decision to go with ACSS was a planning-level decision within CTT and other utilities—primarily for more ampacity if they ever needed it.”

Committed to the Challenge

CTT selected Great Southwestern to provide material procurement support, right of way (RoW) construction, foundations, conductor installation and final restoration for the project. While the CTT project was the largest in their 36-year history, Great Southwestern’s experience, logistical expertise and core values of safety, integrity and teamwork made them the ideal candidate.

The overhead conductor selected for the CTT project was General Cable’s 1590 kcmil Falcon ACSS. Originally patented by Reynolds Metals, now a part of General Cable, the ACSS design is manufactured using the same “tried and true” process pioneered back in 1972. “We have a long established relationship with General Cable, and extensive experience with their products on projects of various scopes and magnitudes,” says Brandon Lark, President of Great Southwestern. “We are extremely familiar with their reputation for delivering quality products and service.”

The RoW construction and foundations necessitated having five fully-operational construction yards strategically placed along the route to minimize distances. Coordinating the movement of each yard required teamwork of the greatest magnitude.

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“Typically, most projects require only one or two yards, but the CTT project called for five,” explains Mike Bachli, operations manager for Great Southwestern. “There is a lot of planning, cooperation and communication involved when moving from one yard to the next. Production cannot stop, and each subsequent yard must be ready to accept several truckloads of material. Services like electricity, communications and facilities need to be in place prior to these activities taking place.”

RoW construction for the project required Great Southwestern’s flexible communication and coordination skills to ensure access. Crews were met with the challenge of avoiding existing and abandoned gas and oil pipelines traversing throughout the Texas plains.

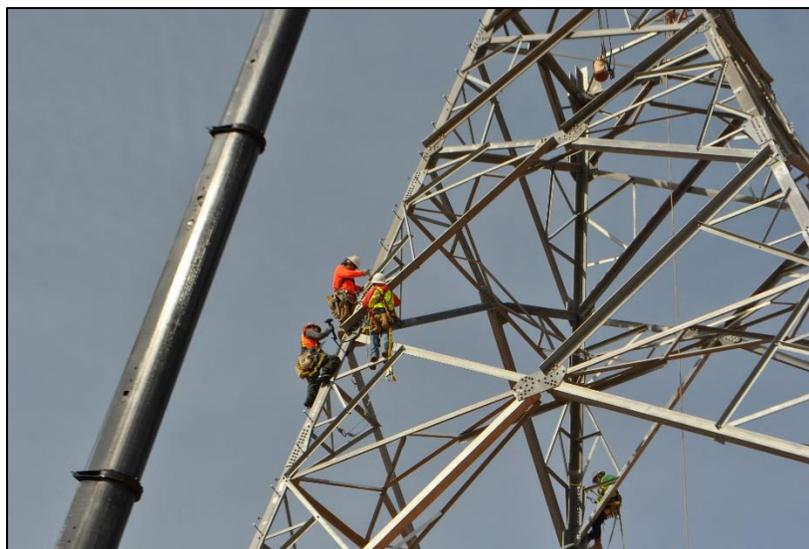
“There were times when we had determined alternate access to right of ways, or install culverts to appease land owners,” said Bachli. “We also had to locate pipelines, which required us to construct special berms and crossings over them so we could safely transport heavy equipment without risk of rupturing the pipelines.”

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The project was not without environmental challenges—everything from heat and wind, to wild hogs, protected wildlife and scorpions, snakes and spiders hiding under pallets and in the plastic coverings on the reels of ACSS. With a strong commitment to safety and teamwork, crews were successful in avoiding the majority of the hazards.

“We took all the right precautions—we kept weeds and grass to a minimum, rocked the yards to discourage critters and kept everything as neat and clean as possible,” says Phil Powell, field engineer for Great Southwestern. “We did have some wind delays—it’s not safe to work up on structures when winds are more than 30 miles per hour. We regularly monitored weather forecasts and used wind anemometers to ensure our safety.”



To help with the CTT project, Sturgeon Electric Company, another subsidiary of MYR Group, mobilized to string nearly 80 miles of the double-circuit 345 kV ACSS lines over a six-month period. Additional crew members were brought from other regions to the project, requiring plenty of cooperation and teamwork. All crews had to comply with Great Southwestern’s stringent safety requirements that mandated more than 20 hours of internal safety and OSHA training.

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“While we had several new employees that required indoctrination into our safety practices, there wasn’t anything we failed to complete,” says Bachli.

Communicating Start to Finish

Since its inception in 1977, Great Southwestern has successfully completed hundreds of projects, distinguishing themselves in the electrical construction industry. The CTT project was no different. Starting in January 2011 amidst the windiest months and installing the last of the lines in August 2013, Great Southwestern succeeded in staying on schedule and within budget—a challenge that was partly overcome with the help of General Cable’s commitment to customer service and support.

“Great Southwestern has been fortunate to develop a number of successful supplier relationships over the years, and I believe this is due to the fact that we’ve been careful about whom we choose to work with,” said Lark.

One key factor that helped keep the project on schedule was the location of the General Cable manufacturing plant in Malvern, Arkansas—just a day’s drive from the site and often referred to as a “milk run.”

“Having the General Cable plant close by made it easier to change deliveries in the event of weather delays,” said Powell. “We didn’t want to store excess reels of ACSS in the yards, and were able to work closely with General Cable to make sure we had the product we needed where and when we needed it.”

According to Great Southwestern, working with General Cable was a smooth process—from responsiveness and communication, to delivery and billing. “Although there was a substantial amount of reels required for the project, General Cable did an outstanding job of making sure we had the right material and quantities on site at all times,” Powell said. “Their coordination and communication efforts were excellent, and they provided us with detailed shipping reports and accommodated our cut-off billing dates and other requests.”

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To correlate with Great Southwestern's billing cycle, all material had to be on site by the third week of each month. General Cable had to coordinate with production to ensure that the right amount of material was available at that time to keep the project moving forward. Each cable reel was also carefully tracked and labeled based on whichever segment of the transmission lines was being installed.



“Installations of this magnitude require separate weekly meetings to make sure we stay on track,” said Susie Mcallister of General Cable. “Great Southwestern was excellent to work with—they were very flexible and appreciative of our resources and one-on-one communication. Their understanding of what it takes from a logistical standpoint for us to ensure that the project is successfully completed on time and within budget reflected their years of experience.”

As a global leader in the wire and cable industry, General Cable has long been committed to sustainable business practices and conservation programs. Dealing with scrap is part of any cabling project, and General Cable's environmental reel return policy and vendor relationships help generate revenue through the recovery of scrap conductor. General Cable collects reels with unusable conductor lengths and processes the scrap to safely recover the metals and pass the savings on to their customers.

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For the CTT project, General Cable coordinated with a dedicated carrier for delivery and pick-up of reels, keeping the yards clear and open for new shipments.

“If less than 1000 feet of conductor was remaining on a reel, we couldn’t use it,” says Powell. “Being able to return this scrap conductor back to General Cable was beneficial—it eased logistics and we received refunds for the unused portions. We established a special program with General Cable to ensure we could deliver CTT the best return on the scrap conductor.”

Continuing the Efforts

With its proximity to Interstate 40 and Texas state highways, the 235 miles of double-circuit 345 kV lines using General Cable’s ACSS conductors and hundreds of structures provides plenty of exposure for everyone involved in the two-year project.

The CTT project will certainly help Great Southwestern’s momentum in the industry and prepare them for future large-scale projects. For General Cable, the project will provide the leverage to continue bringing ACSS technology and dedicated service commitment to other renewable energy projects around the nation. Already, General Cable’s ACSS is being considered for additional wind energy projects throughout the mid-south region.

One of the most significant benefits that came from the CTT project included strengthened relationships among all the experienced stakeholders involved. “This high profile project is a great addition to our resume for future work,” said Cannon of Burns & McDonnell. “But the biggest value was that it strengthened our partnership with CTT, Great Southwestern and General Cable, making us well positioned to collaborate on similar future projects.”

While cooperation, commitment and communication all made for a successful project, the end result is something the industry as a whole can be proud of—the delivery of clean renewable wind energy to millions throughout the Lone Star State.

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“A strong reputation in terms of safety, quality and integrity are imperative for a successful project outcome, and these are values that Great Southwestern strives for on every project,” said Lark of Great Southwestern. “When we work with suppliers that exhibit the same work behaviors that coincide with our core principles, all project players are aligned and more likely to reach goals and benchmarks in a streamlined, efficient manner.”

WANT TO LEARN MORE? [CLICK HERE TO VIEW THE CTT PROJECT VIDEO!](#)

TransPowr® ACSS—A Better Transmission Choice

During times of peak demand, aluminum conductors can reach higher operating temperatures, which can cause thermal expansion, reduced tensile strength and elongation. This introduces susceptibility to high temperature creep (i.e., deformation) problems and conductor sag, reducing the safety clearance of the lines and the potential for connections to become loose, heat up or cause dangerous arcing.

Unlike the alternative ACSR conductors that can be susceptible to the long-term creep of aluminum, ACSS conductors are only dependent on the long-term creep of steel wires, which is very low. Even in extreme circumstances, the long-term creep of steel has only a small impact on sag performance.

ACSS conductors sag less than ACSR under emergency electrical loading conditions. Additionally, unlike ACSR conductors, ACSS conductor final sags are not affected by the long-term creep of the aluminum. This enables increased current carrying capacity for higher electrical loads. Compared to ACSR with a typical 75°C operating limit, ACSS can operate at up to 250°C. Based on comparison testing under the same environmental conditions, the ampacity rating at 75°C for ACSR is 905 Amps while the ampacity rating at 200°C for ACSS is 1660 Amps.

Because ACSS conductors offer much higher ampacity, the overall size of the conductor can be smaller. By eliminating the need for larger conductors and shorter reels, pulls can be longer with fewer set-ups. This can help save installation time and labor costs while providing the cushion of a higher ampacity rating.

Because the tensile stress in the aluminum wires of the ACSS conductor is much lower than in the alternative ACSR conductors, ACSS is also less susceptible to damage caused by wind-induced Aeolian vibrations—something that can cause wires within the ACSR conductor to break. This makes ACSS uniquely positioned to provide better reliability in windy environments like the CREZ areas of Texas.