



Savings by Design

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achieve multi-million dollar savings



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From sea life to night life — family fun or time in the sun — there are endless reasons to visit The Sunshine State. And the epicenter of it all is Orlando, Florida. As the most visited destination in the United States, “The City Beautiful” has mastered the art of attraction. The unsung hero behind that hospitality? Reliable energy.

Serving nearly a quarter million customers in the rapidly growing area, Orlando Utilities Commission (OUC) helps to power all that is Orlando — both the ordinary and the extraordinary.

By partnering with Leidos, OUC was able to add much-needed capacity to its transmission system at less than half the anticipated cost. The powerful pairing will help ensure the Orlando Utilities Commission continues to live up to its nickname: **“The Reliable One.”**

THE CHALLENGE

To serve the area’s growing appetite for energy, OUC planned a project to increase ampacity — the amount of power that can be transmitted — via two critical nine-mile, 50-year-old 230kV transmission lines and connecting substations.

With both lines supported by the same series of lattice towers, OUC required that upgrades be performed one circuit at a time to maintain the reliability of the electrical grid. As an added schedule constraint, lines could only be taken out of service during two brief windows of time: October through December, and March through May. This restriction helped ensure that the state’s energy providers could meet peak demand for air conditioning in summer and electric heat in winter.

Adding to the complexity of the project, the lines in question were located in an environmentally sensitive area featuring wetlands and endangered species. Working in the right-of-way requires special care, including measures such as matting, restoration, and silt fencing. Beyond that, endangered species in the area such as the gopher tortoise must be documented and avoided during work activities. Along with local wildlife, the line was adjacent to a number of businesses and residents.

With 80 transmission towers in question, a total rebuild was estimated to cost as much as \$20 million, including at least \$100,000 to replace each tower plus the cost to design and construct a temporary line. For these and other reasons, OUC sought a solution that would eliminate the need to completely rebuild these two transmission lines or build a third transmission line elsewhere.

OUC’s aggressive timeline would help ensure that the new, larger capacity lines would be in service by the end of May 2017 — just in time for air conditioners to kick into high gear.

With project parameters defined, OUC turned to Leidos in early 2016 to independently review viable options. The team was tasked with identifying the most effective and affordable approach to increase ampacity while minimizing downtime.

DOWN TO THE WIRE

With this mission in mind, the Leidos team immediately began a comprehensive conductor analysis that took into account cost, schedule, structural issues, and environmental concerns.

Based on the recommendations of Leidos engineering experts, OUC considered several new and innovative conductor options, including Aluminum Conductor Composite Core® (ACCC). ACCC uses a composite core for strength versus conventional conductors that use steel cores. ACCC mimics the size, weight, and sag profile of conventional conductors, while carrying far more power (the light, small, yet very strong composite core allows for more electrically-conductive aluminum). Leidos evaluated a number of ACCC sizes as well as other options, including conventional conductor types.

The team sought ways to retrofit existing transmission towers and minimize costly structural replacements, which could easily exceed \$100,000 per transmission tower. This involved evaluating the physical loading that current structures could support. The analysis had to consider the fact that larger conductor sizes are heavier and subject to greater wind loading. The new conductor would also need to be strung to higher tensions to reduce conductor sag, keeping the conductors safely high in the air. The team also had to ensure the new design did not allow conductors to 'blowout' (deflect laterally due to wind), which could put them too close to the tower, other lines in the right of way, or exceed right-of-way limits.

At first glance, more cutting-edge conductor types such as ACCC are considerably more expensive than conventional conductor types. However, extensive utility industry experience has shown Leidos that the greater up-front costs of these technologies can be offset by the minimal structural work they require.

Construction is lighter with the ACCC than other reconductoring options because it requires only bucket trucks, light duty cranes, and medium-weight equipment trucks for the pulling operations. In contrast, a full line rebuild, including structure replacement, requires all of the above — plus heavy-duty construction cranes, large flatbed transport trucks, forklifts, excavators, dump trucks, vibratory hammers/pile drivers, drilling trucks, and cement trucks.

To ensure an apples-to-apples cost comparison, Leidos examined the full lifecycle costs of each conductor option, including future expenses. For example, electrical losses occur over time with any type of conductor and vary based on many factors, including conductor construction and temperature. Leidos' analysis estimated the present value of lost electricity over the expected lifetime of each type of conductor.

A STUDY IN SAVINGS

The comprehensive research completed by Leidos allowed Orlando Utilities Commission to make an informed decision on the most effective, least-cost reconductoring option — in this case: the Aluminum Conductor Composite Core solution. ACCC offers the advantage of carrying more capacity with the same size conductor as traditional solutions. Another selling point? The much lighter construction needs associated with the ACCC option allowed work to be completed much more quickly and with less impact to wetlands, endangered species, and neighboring residents.

OUC easily ruled out the more conventional reconductoring options due to the extensive structural rebuild it would have required. This would have been prohibitively expensive, time consuming, and environmentally destructive. In light of the project's aggressive schedule, a full rebuild, while keeping a circuit in service, was simply not possible.

Along with environmental and schedule benefits, OUC's choice saved as much as \$12 million, compared to original cost estimates.

Leidos leveraged its specialized knowledge of lattice tower design to contribute to those savings. While a common sight, lattice towers are no longer widely used in the United States; therefore, knowledge of how to properly analyze, design, and retrofit them is becoming increasingly rare.

Leidos' analysis identified about a dozen towers that potentially needed to be replaced

to accommodate the reconductoring. Having worked on lattice tower projects around the world, the Leidos team was able to develop cost-saving designs that allowed OUC to retrofit nearly all of the towers at a cost of about \$10,000 per tower — a fraction of the cost of replacement.

Thanks to Leidos' carefully thought-out design, only three towers required replacement. To minimize the cost impact, the quick-thinking Leidos team diverted and repurposed four steel poles that had been ordered for another OUC project, which was later canceled. This sped up the construction schedule and allowed the client to avoid a substantial cancellation fee from the vendor.

Leidos team members also needed to act quickly — and burn the midnight oil — to overcome delays caused by an unwelcome visitor: Hurricane Matthew.

Drawing on extensive design and utility experience, Leidos helped the client navigate a challenging project with finesse. By working closely with OUC and listening to their unique challenges, priorities, and concerns, the Leidos team delivered the facts needed to save the utility — and ultimately, its customers — millions of dollars.

By lending its expertise to a critical decision, Leidos helped ensure that the Orlando Utilities Commission will remain **"The Reliable One"** far into the future.

Let Leidos Lead the Way

Utilities around the world turn to Leidos when they need unbiased expertise and innovative solutions. Our sought-after design services are informed by decades of front-line experience with utilities. The Leidos team can identify safe, reliable, environmentally sound solutions for transmission line and other utility projects, while helping owners capture significant financial benefits.