

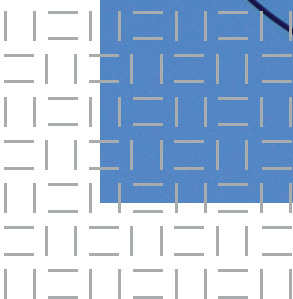
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CASE STUDY / INTEGRATED DISTRIBUTION PLANNING

Reimagining the electric grid

The world's electrical needs are evolving — the electric distribution grid must evolve with them. Entergy is using a bold new holistic planning process to jump-start this transformation.



Entergy is improving the capabilities and reliability of its electric grid to meet changing customer needs. A data-driven and integrated approach to distribution planning is the key.

Project stats

Client
Entergy

Location
New Orleans, Louisiana

Completion date
2018

15%
of Entergy's
circuits analyzed

4
states: Arkansas,
Louisiana, Mississippi
and Texas

27%
of Entergy's electric
customers served

600+
circuits analyzed
holistically

CHALLENGE

Like other electric utilities, Entergy is facing a future that bears little resemblance to its past. The investor-owned utility acquired and built its distribution grid in an era when consumers had exclusive, largely passive relationships with their power company. Entergy generated and distributed electricity, and ratepayers used it in similar ways.

But in recent years, the needs of the company's 2.8 million customers have changed, their expectations for service options and reliability growing. Some expect Entergy's electric distribution system to accommodate everything from rooftop PV systems to corporate microgrids. Others want to recharge their electric vehicles with cheap power. All want clearer insights into their own energy usage and more opportunities to participate in money- and energy-saving programs.

Entergy's aged electric distribution infrastructure — made up of diverse legacy systems — lacked the technology, flexibility and resiliency to meet these expectations.

SOLUTION

The first step was to study Entergy's distribution system and practices using a novel, data-centric methodology. The goal? To transform Entergy's distribution planning practices, and as a result, its grid.

Distribution planning practices generally focus on fixing a specific problem as quickly and cheaply as possible. If a circuit performs poorly, utilities quickly derive and apply a low-impact fix to bring the circuit back to compliance or barely acceptable performance. Planning for the future is not a top concern.

■ Long-term goal: to transform the way we plan, build and operate the grid

After completing the grid modernization pilot program, Entergy was better equipped to meet the needs of today's customers with:

- Improved operational consistency for increased reliability, performance and service quality.
- Reduced failure risks and improved cost control.
- Improved visibility into energy use and service performance.
- Faster response time on outages.
- More efficient overall operations.



Our integrated distribution planning model takes a more holistic approach. Instead of reviewing only the problem area of a circuit, we analyze big-picture data related to the circuit, its assets and the surrounding system. We consider power flow, reliability, failure risk, protection, coordination and operational efficiency together. Then we develop projects to address multiple suboptimal conditions simultaneously.

By using system model data and asset data together, we determine the most efficient way to apply limited capital resources to sustainable change. This approach identifies the projects with the greatest potential to address customers' changing needs and system performance, both now and in the future.

A detailed understanding of Entergy's design and operating standards was critical. Armed with this, our team recommended updates that would better align with Entergy's long-range goals and address future customer demands.

Next, we conducted a detailed engineering and asset analysis across more than 10% of Entergy's circuits. This included examining the design, performance, age and health of each circuit. Using state-of-the-art mobile technology and GIS tools, inspectors first went into the field to validate system data and asset health and collect data on 64 pilot circuits.

The data was compiled in a geospatial asset database, along with all other system and asset data.

We used the database to conduct power flow simulations and other tests to assess system performance, asset trends and risk modeling. Finally, we identified projects to improve circuit performance, enable system flexibility and resiliency, and decrease overall system failure risk.

RESULTS

In one instance, engineers conducting a traditional load flow analysis identified a voltage stability problem. Often, this is addressed by adding a phase and associated conductor to a long lateral segment. But further holistic study of the circuit identified the same circuit segment as at very high risk of "vegetation events" — that is, trees falling on the lines. Holistic study also indicated the segment consists of significantly aged assets due for replacement.

We determined that adding rerouting or resiliency to address the vegetation and aged asset renewal would add marginal cost. Yet, it would make a significant difference for overall performance and risk.

In later phases of the project, we focused on refining our method for identifying and prioritizing holistic projects. We also developed a road map for institutionalizing the new

■ Specialized services

- Distribution engineering
- Distribution modeling
- Field data acquisition
- Geospatial data hosting, organization and visualization
- Process engineering
- Program management
- Quality control

planning framework. This road map included processes, data and tools that will allow Entergy personnel to continue to develop and implement sustainable projects on a recurring planning cycle.

About 1898 & Co.

1898 & Co. is a business, technology and security solutions consultancy where experience and foresight come together to unlock lasting advancements. We innovate today to fuel your future growth, catalyzing insights that drive smarter decisions, improve performance and maximize value. As part of Burns & McDonnell, we draw on more than 120 years of deep and broad experience in complex industries as we envision and enable the future for our clients.

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11706-IDP-0819