sense | Southern Company

Before the Outage: Grid-edge Insights, Real Results

Sense's Fault Detection Pilot with Southern Company

Summary

What if your meters could help identify grid risks before they become outages?

That's the focus of our Fault Detection pilot with Southern Company, including Georgia Power and Alabama Power. Together, we've advanced grid issue detection and localization capabilities designed to identify acute vegetation risks—and other emerging distribution issues—at the transformer level.

The Goals:

- Identify vegetation-related risks at the distribution level
- Improve localization accuracy within plus or minus 100 meters
- Develop early-stage classification for issue type and risk level

For Southern Company, the pilot helped explore new technologies to strengthen vegetation risk management and reduce transformer-level outages. In parallel, the pilot has helped inform critical smart meter investment decisions including the technical specifications required to support advanced grid issue detection.

For Sense, the pilot has provided dense, feeder-level data and real-world validation.

Approach

Targeted Deployment

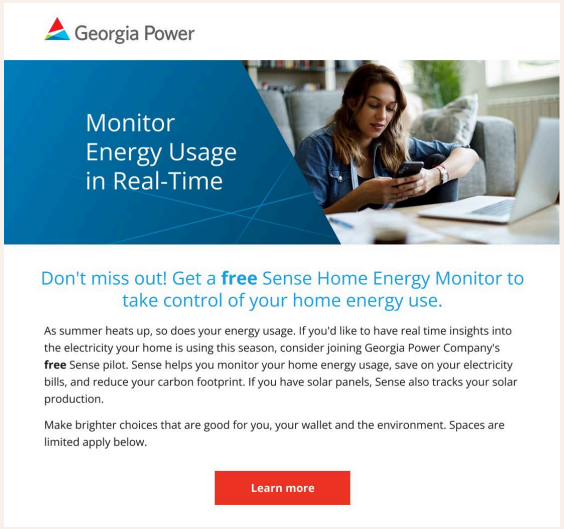
The team at Georgia Power selected three target feeders based on their historical vegetation-related outage activity. These circuits also provided a meaningful mix of geographic and vegetation risk profiles. One feeder serves a more densely populated urban area. The other two serve more remote territories.

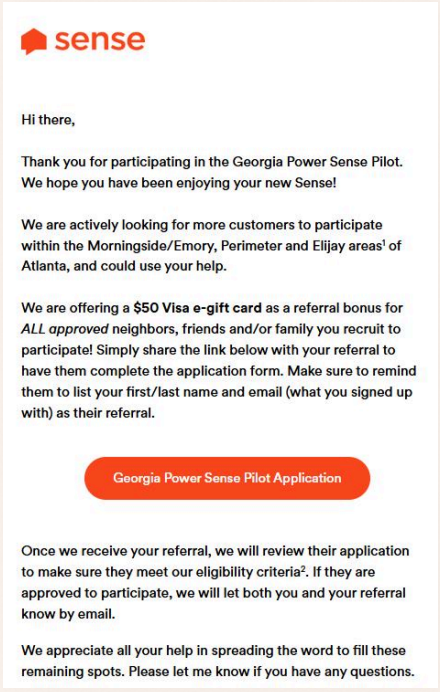
Customer Recruitment

Customers were intentionally selected for Sense installations within the designated feeder areas. The recruitment process included:

- Direct email campaigns sent by Georgia Power;
- Geographically targeted social media campaign and;
- Referral campaign offering a $50 gift card per successful enrollment within the targeted area.

Ultimately for this study, the majority of sensors were deployed on the urban feeder, allowing for higher endpoint density and stronger signal clustering. Overall, we examined 62 homes connected to 58 different transformers, each associated with the designated urban feeder.





Detection methodology

The sensors continuously analyze voltage and waveform behavior using multiple trigger criteria designed to capture abnormal electrical signatures. We will see transient voltage distortions and often a drop in voltage on an affected line. The degree of the drop is a function of fault type and distance. This helps us to create a “footprint” of the fault pattern and enables us to compare to Sense’s database simulations to determine the faults location.

In short, when trigger thresholds are met:

- A high-resolution snapshot of the electrical signal is captured;
- Snapshots are evaluated for clustering patterns;
- Potential events are flagged for review.

To ensure accurate event characterization, detections were analyzed not only within the targeted feeder but also statewide in Georgia leveraging previously installed Sense Home Energy monitors. When anomalies occurred, we evaluated whether they were localized events or part of broader, system-wide disturbances by checking for simultaneously timed signals across regions.

> **This approach helped distinguish feeder-specific vegetation issues from widespread grid events.**

Sense shared an updated event log with Georgia Power to cross-reference detected events against their SCADA system, field findings, outage tickets, and operational records to validate ground truth. This structured feedback loop enabled ongoing refinement of detection logic while ensuring alignment with field-confirmed events.

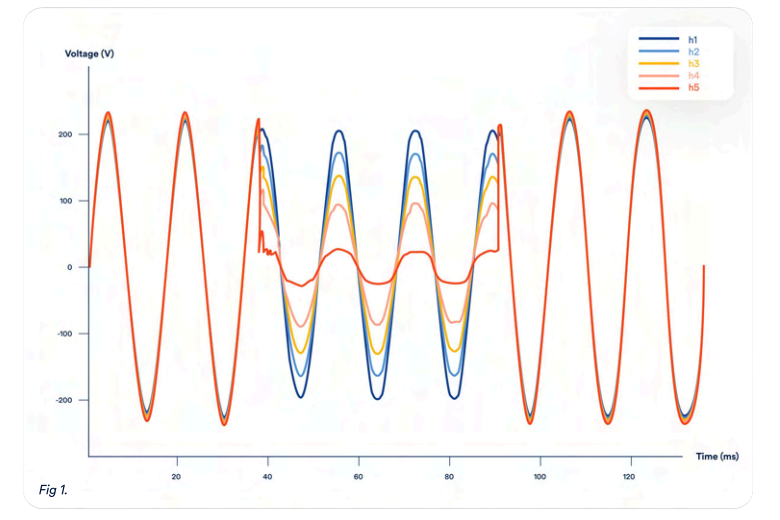


Fig 1. - This image illustrates a distortion in the waveforms observed across 5 separate sensors. The degree of the drop is a function of fault type and distance.

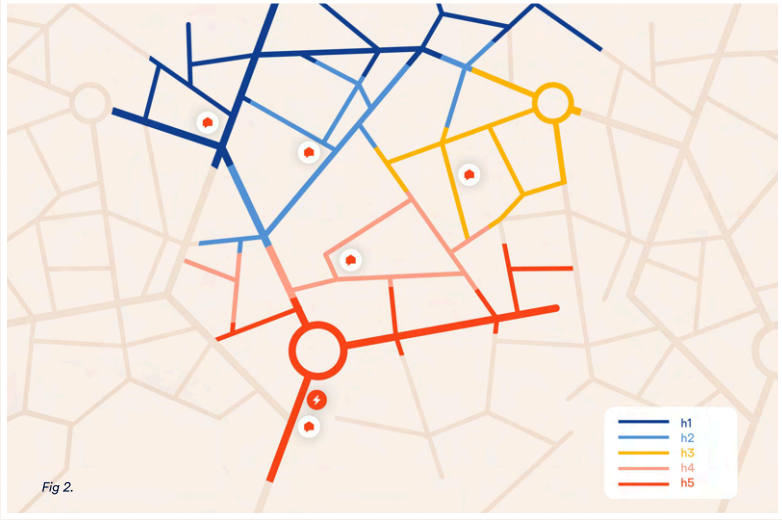


Fig 2. - This image represents a sample "footprint" of the fault pattern. These patterns are compared to Sense's database simulations to determine the fault's location.

Impact

The pilot is already demonstrating that meter-native Grid Issue Detection can surface real, actionable events at the distribution level.

As of October 2025, we have confirmed 19 detected events that resulted in utility tickets. Georgia Power has verified that 15 were vegetation-related. Two additional events were attributed to a squirrel. The remaining two events are under review or categorized as other grid disturbances.

Important: We have not missed a confirmed vegetation event. **There are zero false negatives to report.**

In parallel, the system has identified 10 additional distribution primary anomalies. They represent early indicators of broader detection capability beyond vegetation-specific issues.

These results validate three critical performance dimensions:

01 Detection Sensitivity

Vegetation-related disturbances are being identified consistently, with no confirmed misses to date.

02 Need for Density

Location accuracy is highly related to density of the deployment. Significant improvements are expected when 5-10% of the homes on a given feeder have sensors.

03 Expanded Applicability

Primary-side anomaly detection suggests applicability beyond transformer-level vegetation risk—opening the door to broader grid visibility.

Impact

Vegetation-related outages at the transformer level are often localized, unpredictable, and resource-intensive. Detecting these events earlier—and with geographic precision—directly supports:

- Faster field response;
- Reduced outage duration;
- More targeted vegetation management;
- Lower operational costs.

Equally important, zero false negatives in confirmed vegetation cases builds confidence in detection reliability—a foundational requirement for operational deployment. The early results demonstrate that Grid Issue Detection is not theoretical. It is identifying real-world events in live distribution environments today.

> Sense technology has been used in many markets to help homeowners better understand their energy usage and find ways to save on energy costs, but we see a bigger opportunity to leverage disaggregated data on an enterprise basis to gain a clearer picture of grid conditions, early detection of vegetation issues and improved regulatory compliance.
>
> **Wesley Granade,**
> AMI/MDM manager for Georgia Power

What's Next?

Second phase to kick-off in 2026

The initial pilot leveraged sensors in legacy Sense Home Energy monitors as a proxy to Sense-enabled meters. With the success of this first phase, both utilities are planning to expand the pilot to Sense-enabled cellular meters across both service areas in a second phase of the pilot to kick-off in 2026. This move will strengthen the pilot—enabling meter-native detection aligned with future AMI 2.0 deployments.

The next phase of the pilot will focus on expanding validation volume, refining localization precision, and converting anomaly detection into operational workflow integration, as well as a wider range of Sense capabilities, including Home Analytics, deeper intelligence on inefficiencies behind the meter and tools to help customers with remote energy audits.

Learn more about Sense:

https://sense.com

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