



# COMMUNITY-BASED ENERGY UTILITIES IN THE 21ST CENTURY

Modern Approaches to GIS for Community-Based Utilities





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# INTRODUCTION

Thousands of community-based energy utilities provide natural gas and electric service in the United States and around the world. Their millions of local customers often enjoy favorable rates, community involvement, and established infrastructure.

Despite consensus around the criticality of energy infrastructure, historical investments and practices have resulted in portions of it falling into disrepair, nearing end of life, or no longer meeting modern requirements. As a result, it is aging, and infrastructure is being challenged and strained in new ways by climate change, security threats, and increasingly severe natural disasters.

Public utilities, cooperatives, and municipalities face these industry challenges without large technology budgets or support staff. Still, these organizations need to see what is happening and where.

Overcoming these challenges seems overwhelming at times. However, utility issues and solutions have something in common: location. It's hard to think of a utility process that ignores location.

Utilities all use maps. Why? Utilities work better with a geographic approach.

Today, adding advanced capabilities like mobile solutions, dashboards, analytics, and efficient record keeping can be straightforward and cost-effective for utilities of all sizes. A modern geographic information system (GIS) enables new results—it devours underutilized data, harnesses analytics, and runs on any device. Engaging apps tailored to each user's role help transform utilities.

This ebook explores how community-based energy utilities modernize their work with practical, economical tools for field operations, emergency management, asset management, and safety and compliance.



# TECHNOLOGY FOR THRIVING IN THE 21ST CENTURY

Customers and governing boards now require utilities to operate in a way that considers social, economic, and environmental well-being. Staff currently providing safe, reliable, cost-effective service must now likewise consider sustainability, resiliency, equity, and modernization. To achieve this, they

- Pinpoint where the greatest needs exist.
- Analyze network plans and impacts using added data like equity demographics, alternative fuel corridors, and risks.
- Maintain transparency with regulators and customers.
- Respond in near real time.
- Improve collaboration with internal and external stakeholders.

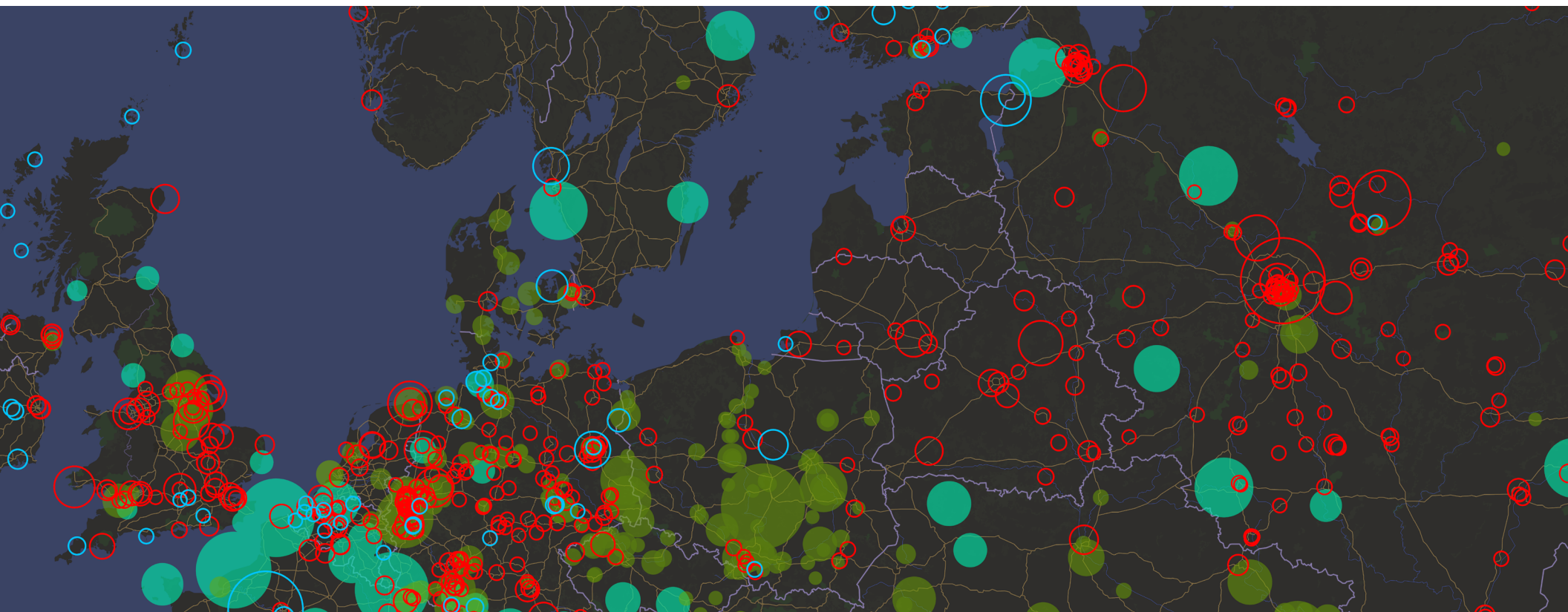
Better decision-making includes: understanding the performance of existing networks and finding bottlenecks. Moreover, utilities must monitor their progress carefully to ensure on-time and on-budget project delivery.

GIS technology catalyzes the enhancements utilities urgently seek today and will be seeking tomorrow. In the struggle to remain relevant and thrive, utilities look to advanced technologies with wide-ranging advantages like ArcGIS software.

“GIS takes a cue  
from social media;  
once anyone  
makes a change,  
those changes are  
visible to all.”

– Bill Meehan,  
Empowering Electric and  
Gas Utilities with GIS





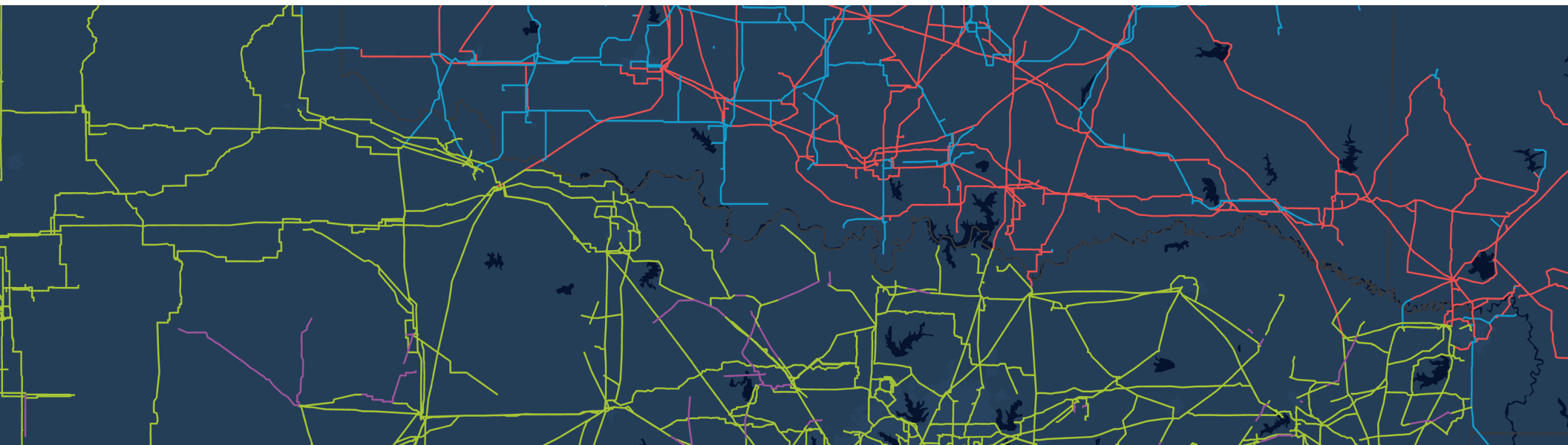
## THE GEOGRAPHIC APPROACH continued

GIS technology has the power to layer volumes of data—including energy networks, field reports, imagery, sensor inputs, weather, and demographics—onto a smart map or dashboard and update it in real time.

Here's the why: A geographic approach is critical to addressing the life cycle of infrastructure activities—managing assets, operations, projects, networks, and information

technology. An enterprise GIS empowers staff with tools for visualization and analysis of all relevant data in the specific location context—key to setting infrastructure priorities and then planning, delivering, and operating safely and efficiently. By providing a realistic view, down to hyperlocal details, GIS is also the ideal technology for setting goals and measuring outcomes for sustainability, resiliency, equity, and modernization.





CUS Electric Power Transmission Lines

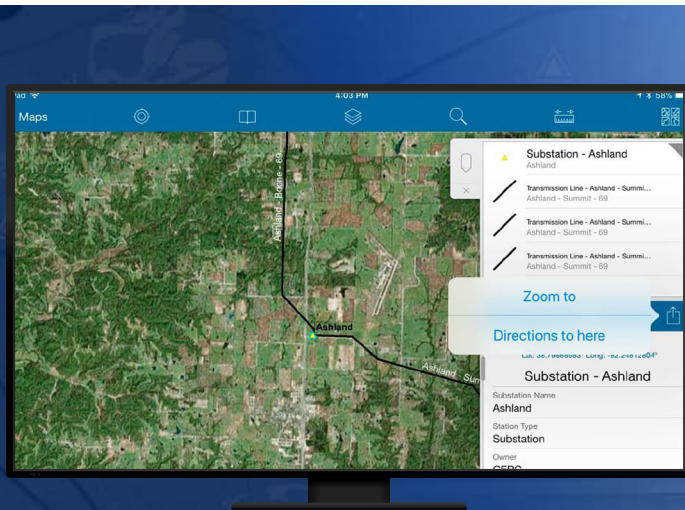
Here's the how: People simply understand data better when they see it on a map.

A modern GIS makes it possible to discern the precise location and details of every facet of infrastructure, whether above or below the ground, inside or outside facilities. Employing GIS technologies to design, plan, visualize, and collaborate in real time optimizes infrastructure investments, avoiding inefficiency and waste in the following activities:

- Planning, building, and operating infrastructure through its entire life cycle
- Prioritizing repair work and predicting issues before they happen
- Optimizing logistics operations with efficient routes for workers and materials
- Bouncing back after disruptions and natural disasters with an accurate picture of customers and assets
- Managing risks to people, property, and the environment by using a location-based system to meet regulatory requirements

GIS is more than technology for making maps—it is a basis for practical solutions. As a result, utilities worldwide invest strategically in location-aware information capabilities as a foundation for business refinements, modernization, and customer engagement.





## THE GEOGRAPHIC APPROACH FIELD OPERATIONS

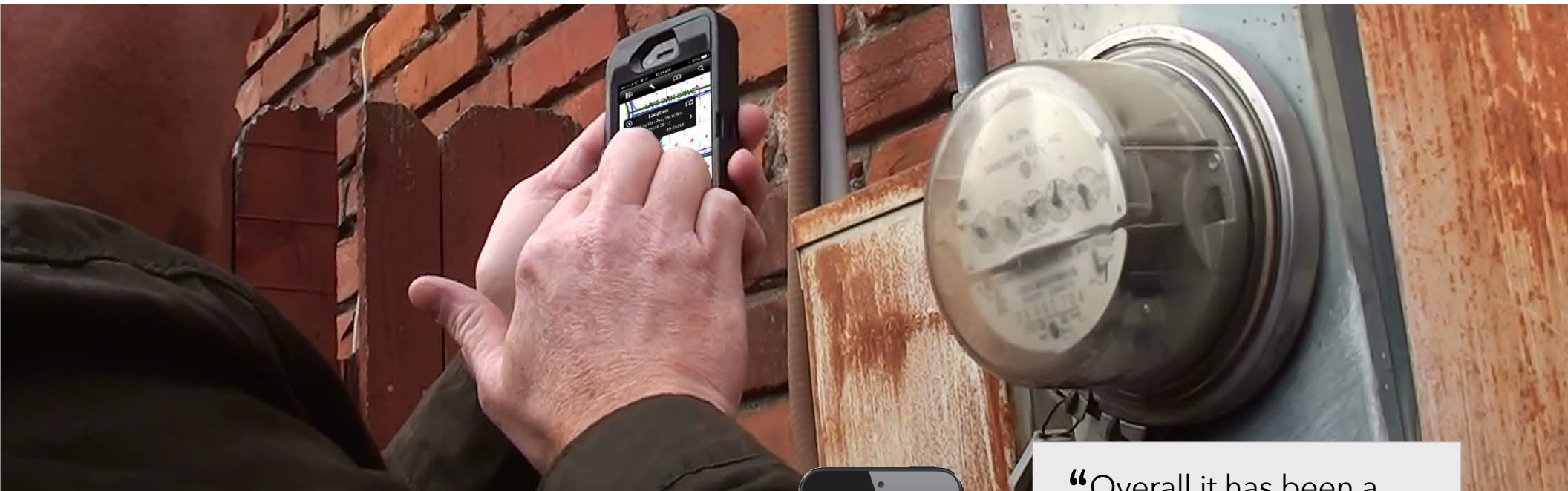
Utility operations demand the best use of resources. Colorful data dashboards reveal impacts and enable staff to track work, providing immediate feedback. Digital revitalization of stale processes reduces reliance on paper, helping to enrich workflows. Without this optimization, costs increase over time, and response times are delayed. GIS provides efficient tools that employees enjoy using.

Routine work consumes most of a utility's field labor hours—all hinging on good information. For example, Central Electric Power Cooperative (CEPC) in Missouri

performs annual inspections, maintenance, and service to its equipment. Because office staff members and line workers often worked with inaccurate system maps and different information, significant inefficiencies resulted. Using ArcGIS apps, [CEPC deployed mobile maps on iPads](#) and used the same devices to capture inspections and navigate to work sites. As a result, crews completed their daily work assignments without calling the office for additional details or referring to paper maps. Line workers had all the information they needed at their fingertips for the first time.

“The crew [members] found that ArcGIS apps were easy to use and made work more efficient. Now, they rely on their iPads as a single source of truth for an accurate picture of the electric system while they’re in the field.”

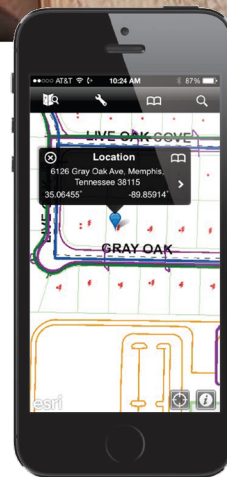
— Andy Adrien ,  
Right-of-Way Coordinator, CEPC



## FIELD OPERATIONS continued

Memphis Light, Gas, and Water (MLGW) in Shelby County, Tennessee, faced similar issues. When responding to customer reports, field staff lacked vital information about infrastructure and its location. As a result, delays and return trips slowed the resolution of complaints. [MLGW recorded the precise location, condition, and photographs of meters on crews' mobile devices and stored the information in a central database.](#) Armed with accurate, up-to-date information about its meters, MLGW has been able to more quickly and efficiently resolve customer issues.

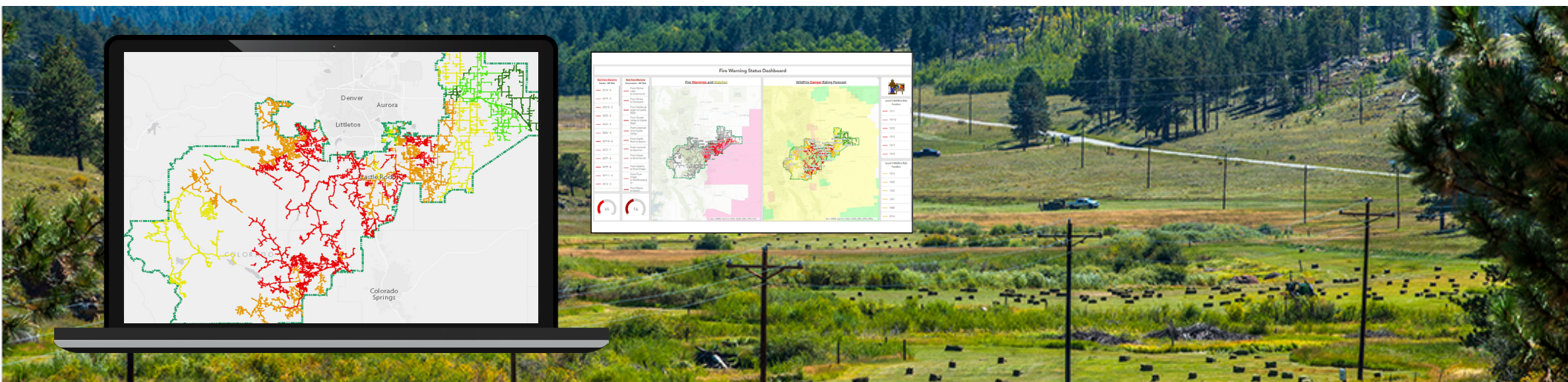
Service levels improve when employees see their work in context, monitor status, and provide immediate updates.



“Overall it has been a good, low-cost solution that has saved time associated with meter reading research and provided good quality controls without requiring additional resources in the field.”

– Eliza King,  
Customer Metering and Billing Manager,  
MLGW





## THE GEOGRAPHIC APPROACH EMERGENCY MANAGEMENT

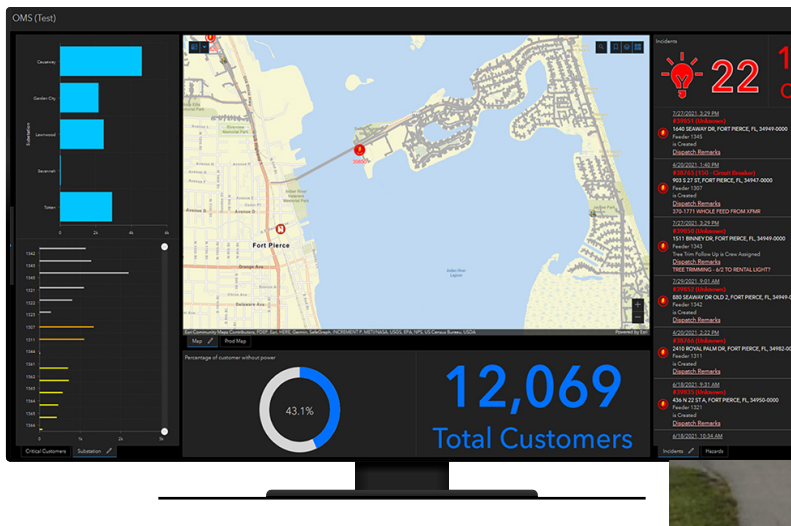
Communities must be able to both mitigate risk and recover from emergencies quickly. Emergency management is an ongoing process that begins under blue skies and continues through rapid response and recovery. As a result, community resilience reinforces positive economic, social, and environmental outcomes—and it's largely dependent on critical energy infrastructure.

A geographic approach to infrastructure uncovers weaknesses and focuses hardening efforts. Going further, reliable information supports real-time decision-making and timely communication—critical particularly in the early hours of an event.

[CORE Electric Cooperative in Colorado approaches wildfires by employing the following:](#) risk analysis, mitigation, situational awareness, and response. The utility uses a geographic approach to address these needs. Adding publicly available data to CORE's infrastructure information produces a risk map of wildfire potential across the organization's service territory. This analysis guides mitigation, which includes hardening efforts. Situational awareness leads to rapid incident response as well as timely communication with employees and the public.

“CORE's fire mitigation efforts are a top priority. The central component to our plan is utilizing ArcGIS to identify and prioritize our risks, track mitigation efforts, and provide CORE and our members [with] the situational awareness required to be successful.”

– Pam Feuerstein, COO,  
CORE Electric Cooperative



# EMERGENCY MANAGEMENT continued

Using Esri's GIS technology, Fort Pierce Utilities Authority (FPUA) improved its hurricane response and power restoration process. After severe weather challenged their traditional paper-based system, FPUA adopted ArcGIS to digitally manage damage data, streamline work assignments, and maintain real-time situational awareness. This approach enhanced crew efficiency, optimized resource use, and reduced restoration time. Additionally, it simplified FEMA reporting and improved the accuracy of outage information, ultimately leading to faster power restoration and better customer service during storm events. [Read the complete story.](#)

Severe weather events such as hurricanes also threaten Lakeland Electric in Florida. When storms hit, it is essential to assess the damage, restore power quickly, and maintain thorough records. The utility was not content with the time required to collect, organize, and handle paper damage

-assessment forms, which also fell short of Federal Emergency Management Agency (FEMA) reimbursement requirements.

[The municipal utility configured a suite of ArcGIS products to introduce important capabilities.](#) The Damage Assessment Restoration Toolset (DARTS) configuration includes mobile maps, apps, and dashboards to collect damage-assessment information rapidly. "DARTS closed a gap we had getting damage assessment information to crews in a timely manner," said Korey Bush, chief electric system operator at Lakeland Electric. "Instead of having to wait to bring back papers, the dashboard in the control center is instantaneous—we can start assigning work right away . . . a night-and-day difference!"

Communities respond to unexpected circumstances more effectively with informed preparation, rapid feedback, and situational awareness.





## THE GEOGRAPHIC APPROACH ASSET MANAGEMENT

Today, utilities are modernizing their asset management systems to meet the needs of the future. Mobile apps connect the field and the office to boost productivity, reduce errors, and save money. Data repositories and analysis find trends to fine-tune asset decision-making processes.

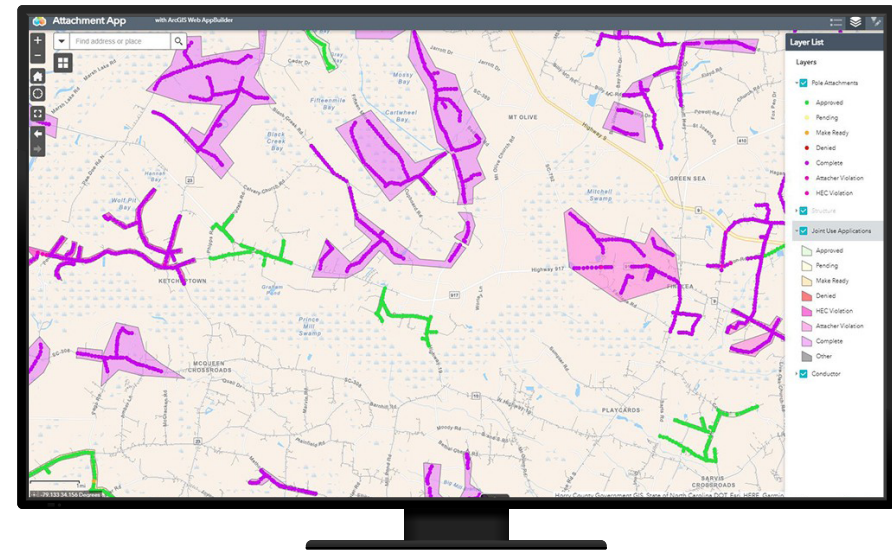
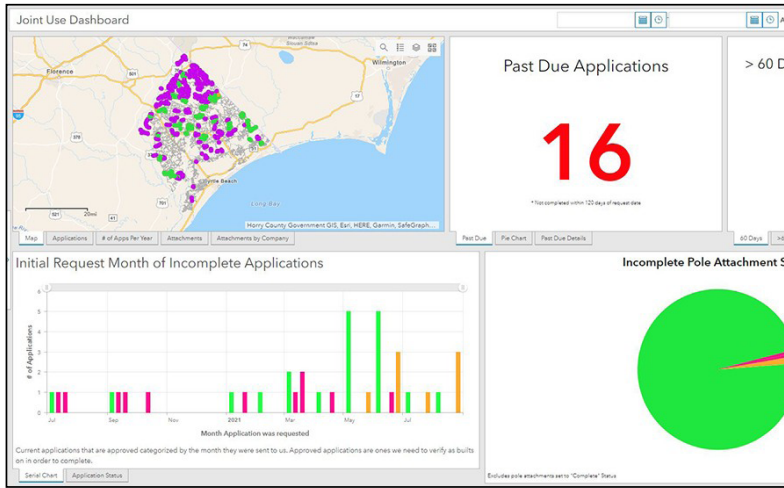
West Boylston Municipal Light Plant (WBMLP) in Massachusetts used paper-based circuit maps that didn't have sufficient detail for keeping pace with customer and utility activity. [WBMLP wanted an easier, more user-friendly way to maintain, understand, and utilize asset information.](#) Realizing that digital transformation was within reach, WBMLP selected the cost-effective [ArcGIS](#)

[Online solution for small utilities.](#) The utility was able to get up and running quickly with the cloud-based software.

Brian Allen, WBMLP assistant general manager, noted, "This is a project we started at ground zero, and we're seeing it grow. It's not one that has taken 10 years to do. I'm very impressed with that. Everything has worked flawlessly." The solution includes many elements, including web maps, mobile tools, field inventory, and dashboards. The apps in this solution work together to streamline work and form a firm foundation for analysis and digital asset management.

"Our industry is seeing our customers move quickly to electrification. ArcGIS will help us to manage that change."

—Jonathan Fitch,  
General Manager,  
WBMLP



## ASSET MANAGEMENT continued

In South Carolina, recent broadband initiatives dramatically increased foreign attachments to the Horry Electric Cooperative, Inc. (HEC), overhead system. The spreadsheet methods could no longer match the quantity or speed of requests, and billing became daunting. [Now each attachment is marked in its correct location with related details throughout the process.](#) Pole stakers use mobile apps to visit the sites and determine suitability or identify makeready work. This information is immediately visible to both HEC and the telecommunication provider. Key

performance indicator (KPI) dashboards monitoring the process draw specific attention to stale applications, ensuring high service levels.

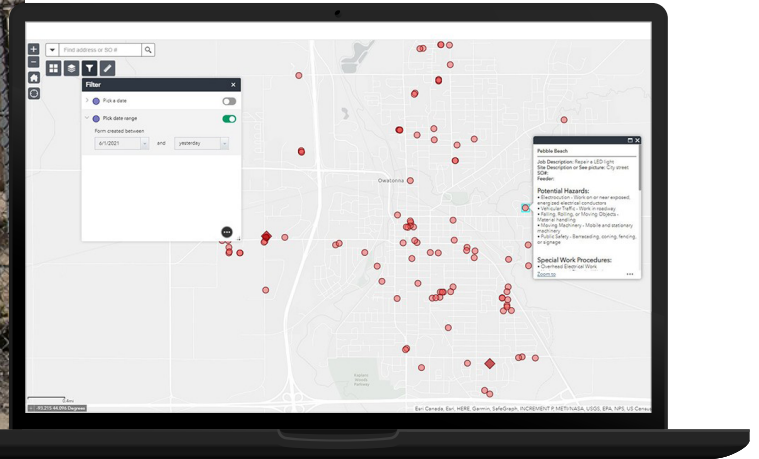
Consistent records now enable staff to rapidly prepare the annual invoices with high confidence. Also, pole attachment revenue increased as a result of the improved workflow.

A geographic approach to asset management—inspection, maintenance, capital, and operational priorities—bolsters KPIs and business results.

“This app helps us organize the entire attachment process. It is nice to see what status each job is at. It is a lot to keep up with, but the new workflow makes it so easy.”

—Franklin Williams,  
Surveyor/Staking Technician,  
HEC





## SAFETY AND COMPLIANCE

For every utility, public and employee safety is job one. The practice of safety and compliance touches every aspect of utilities' work. Knowledge of the hazards and their proximity keeps people safe. And regulatory compliance demands well-executed workflows with precise, transparent record keeping.

To help ensure a safe workplace, Owatonna Public Utilities (OPU) in Minnesota conducts routine jobsite safety briefings following standard industry practices. In addition, [OPU digitized its paper-based process for greater safety and transparency.](#)

Crew supervisors view the surrounding infrastructure with a mobile GIS app as they record safety details. Posted in near real time, active work sites are immediately visible on dashboards across the enterprise, making this a reliable and more accessible procedure. This successful approach in the electric division was implemented for gas and water crews as well.

“The GIS forms solution for the job briefing task has brought increased efficiency and transparency on this critical safety procedure. All forms are now tracked electronically, available for further analytics and accountability. It has also allowed engineering and other support services to check in on a site after already reviewing the hazards and required PPE [personal protective equipment], which keeps a project flowing efficiently and safely.”

– Christian Fenstermacher,  
Director of Engineering and Operations, OPU



Gas Lines Distribution

## SAFETY AND COMPLIANCE continued

Changes in federal utility regulations required Fort Hill Natural Gas Authority (FHNGA) in South Carolina to show improvements throughout its operating systems with historical data. To track issues, FHNGA wanted a fluid way to reference asset data. [As a result, the utility implemented field and office GIS tools, yielding savings in both time and money.](#) In addition, FHNGA's geographic approach further enables federal inspectors to quickly see any operational, sustainability, and system improvements information.

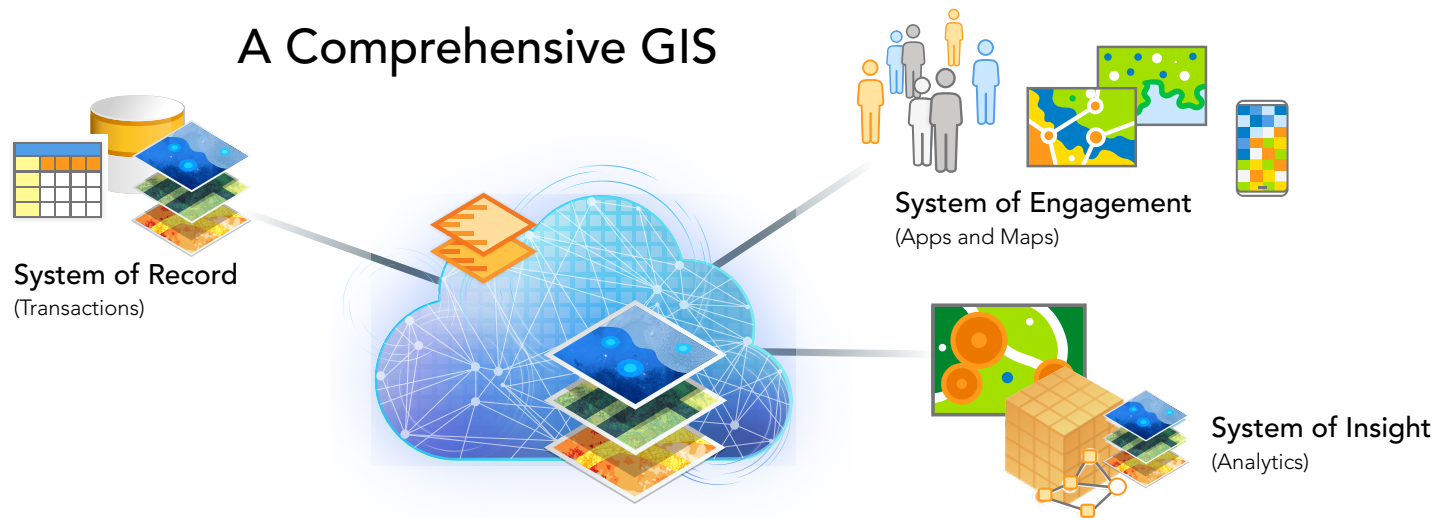
Workers embraced the mobile workflows quickly and appreciated having access to real-time system information, which had not been possible previously. Moreover, FHNGA improved workflow efficiency, exceeding the organization's goals.

For office and field staff alike, effective record keeping affords accurate data and retrieval ease without wasted time. In addition, transparency across the enterprise boosts both safety and compliance for utilities.

**“When you look at all of the attributes you would need to map under a traditional system, it could take 10 to 15 years. With the Esri product, we’ve been able to do 75 percent of that in a two- to three-year window.”**

– Eric Foster,  
Network Administrator, FHNGA





## BEYOND MAKING MAPS

### Comprehensive GIS

Changes in the utility environment and the explosion of data demand vastly better ways of managing, examining, and communicating utility information.

ArcGIS is a comprehensive GIS, meaning that it contains all the elements needed to overcome utility challenges, not just make conventional maps faster. It maintains critical information, helps staff analyze it, and then distribute the resulting business intelligence to everyone that needs it.

ArcGIS does things a traditional mapping GIS can't touch. First, it consumes almost any form of external data. Second, the rich data supports out-of-the-box data analytics for predictive insights. Third, the results are easily exploited with engaging apps personalized to each user's role. In summary, ArcGIS provides focused capabilities that align with how people work today.

These capabilities create a seamless experience, illustrated conceptually as three systems needed to capture data, share it, and understand what it means:

- System of record—Data management and integration
- System of engagement—Sharing, collaboration, and dissemination
- System of insight—Analytics, models, and data exploration tools

The energy industry demands new digital tools that show a comprehensive picture and provide powerful insights. Insights include exceptional visualization on any device, anywhere, at any time. As the requirements for GIS have evolved, so has ArcGIS. It delivers the power to increase the effectiveness in every corner of the utility.





NINL Electric Network DBC

## ESRI'S MISSION

Over the years, Esri has worked alongside our utility customers to build and evolve software that meets the industry's dynamic needs. Despite the changing environments during these uncertain times, our mission remains the same: to help you unlock the potential of your data so that you can better serve your customers. We share your vision for sustainability, so we focus on developing systems that accommodate your

present needs and will prove foundational to your sustainable operations. Our staff and partners have the hands-on industry expertise to help you along this journey.

Contact Esri to discuss the best solution for you. Visit [esri.com/electric](https://esri.com/electric) and submit your contact information to get additional resources.



# GLOSSARY

**ArcGIS**—Esri’s software, which offers unique capabilities and flexible licensing for applying location-based analytics to business practices

**ArcGIS Solutions**—Industry-specific configurations for ArcGIS; a collection of focused maps and apps that help address organizational challenges

**Esri**—The global market leader in GIS software, location intelligence, and mapping

**Geographic approach**—A new way of thinking and problem-solving that integrates geographic information into how we understand and manage our planet

**Geographic information system**—Technology that creates, manages, analyzes, and maps all types of data (GIS connects data to a map, integrating location data [where things are] with all types of descriptive information [what things are like there]. This provides a foundation for mapping and analysis that is used in science and almost every industry. GIS helps users understand patterns, relationships, and geographic context. The benefits include improved communication and efficiency as well as better management and decision-making.)

**Small Utility Enterprise Agreement (SUEA)**—A comprehensive package designed to help small and midsize organizations address their challenges, providing the software needed to deploy the ArcGIS system with a fixed annual price based on the size of the organization (In addition, the SUEA will provide the necessary GIS software to build a scalable system that aligns with business objectives while optimizing the organization’s technology budget.



# Learn More

Esri solutions are used by 90 of the Fortune 100 companies, all 50 state governments, more than half of all counties (large and small), and 87 of the Forbes top 100 colleges in the US, as well as all 15 executive departments of the US government and dozens of independent agencies.

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