Esri News
for Electric & Gas Utilities
Spring 2012

Union Power Gets a Dashboard View

By Jessica Wyland, Esri Writer

The staff at Union Power Cooperative now has a comprehensive view of the electric distribution network, with data from throughout the company merged into one real-time, easy-to-use map called Union Power Operations Dashboard.

Headquartered in Monroe, North Carolina, the cooperative provides electricity and energy-related services to more than 65,000 members throughout the five Southern Piedmont counties of Union, Stanly, Cabarrus, Mecklenburg, and Rowan.

Union Power Operations Dashboard provides real-time and historical outage information, data from the advanced metering system (such as voltage and momentary interruptions), up-to-the-minute work order type and location details, and meter tampering indications. The cooperative's GIS, based on Esri technology, serves as the foundation for the dashboard.

The work was completed by Union Power's David Gross, manager of Operations and Engineering Support, and Todd Harrington, GIS administrator.

"We have taken the Electric Distribution [Operations] Dashboard template from →

continued on page 14

↑ Union Power crews maintain distribution lines.

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GIS Means Business at Esri Electric and Gas GIS Conference

By Barbara Shields, Esri Writer

Participants at the 2011 Esri Electric and Gas GIS Conference in Columbia, South Carolina, met to discuss the value of GIS for improving their operational and business processes. Attendance at the conference increased by 25 percent from the previous year, and many people were first-time attendees.

Utility representatives attributed this increase to recent developments in Esri technology that have placed GIS into the hands of more and more staff via web tools, automated routines, and accessible data. This has resulted in a growth of applications, many of which were demonstrated during the conference by GIS professionals and energy company users.

The GIS user base for many utilities has grown because of enterprise hardware and software configurations as well as the Esri enterprise license agreement program.

During a fast-paced Plenary Session guided by Esri's Patrick Dolan, 27 speakers gave very short talks about new tools, trends, applications, and real-world stories. For instance, a power company manager told the story of how 60 tornadoes downed transmission lines across Alabama in just one day. To get the power back on, the utility provider created maps detailing swath and structural damage, power status, and other analyses. Mobile GIS applications made it possible for responders to access the maps on laptops and iPhones.

Jeff Meyers, former president of Miner & Miner, was awarded the first Esri Electric and Gas Lifetime Achievement Award. Esri's director of utility solutions, Bill Meehan, described Meyers as "the voice of the electric and gas community." During his Keynote Address, Meyers gave a history of GIS for utility facilities management and described how the evolution of technology continues to advance data visualization, network analysis, and underground mapping models.

Keller Kissam, senior vice president of SCANA Corporation, described GIS as a core technology of his business and gave examples of efficiency work processes for valve maintenance.

"Everything that we do flows through our GIS," Kissam said. "It is the hub, and everyone uses it. The liabilities we face on a daily basis far exceed the revenue that we can make on an annual basis. GIS reduces risk, gives us better knowledge of our system, and improves system maintenance."

Kissam invited the audience to visit SCANA Corporation on the last day of the conference to see firsthand how the company has implemented GIS.

Lisa Hightower, GIS manager at CenterPoint Energy, demonstrated a drive-time application that has improved customer service. Rob Brooks of Esri showed GIS applications for Distribution Integrity Management Program (DIMP) administration. Theo Laughner of Tennessee Valley Authority (TVA) challenged the audience members to consider the role of GIS in their 15-year vision.

During the three-day conference, participants filled their agenda planners with best practice presentations, networking events, business meetings, learning labs, and vendor product/service demonstrations.

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Thank You to the 2011 EGUG Officers

Esri also thanks the Electric and Gas User Group (EGUG) officers for their participation in producing this event: president Wayne W. Boone, Alabama Power Company; vice president Theo Laughner, TVA; and conference chair Wayne Meyer, SCANA.

Welcome to the 2012 EGUG Officers

President Theo Laughner, TVA; vice president Wayne Meyer, SCANA; conference chair John Ziakas, Questar Gas Company.

Mark Your Calendars

The next Esri Electric and Gas GIS Conference will convene in Salt Lake City, Utah, October 7–10, 2012. Go to esri.com/electric-gas to find more information about the 2012 conference and to access papers presented at the 2011 conference.

Powering Communities with Clean, Renewable Energy

By Mitchell Garnett, Esri Canada

Over the past 15 years, greenhouse gas emissions in Canada have risen over 35 percent, making the country one of the largest emitters of greenhouse gas in the world.

In addition to environmental and economic repercussions, the release of greenhouse gas emissions into the air can have a detrimental effect on the health of Canadians and lead to increased risk of respiratory and cardiovascular complications. People living in Canada's northern communities are especially vulnerable and face potentially serious consequences to traditional lifestyles, resource development, and conservation.

One of the keys to reducing greenhouse emissions is to replace traditional energy sources with cleaner, renewable energy. In light of this, Mainstream Renewable Power is helping communities across the country fully access their renewable energy assets. With over 16,000 megawatts in the development pipeline, they're using GIS to locate potential sites for wind farms and solar energy power plants, as well as to manage projects as they progress through the development process.

> "Through meaningful maps, we can clearly communicate our due diligence to potential stakeholders."
>
> Craig Weber, Mainstream Renewable Power

Site Selection, Project Management

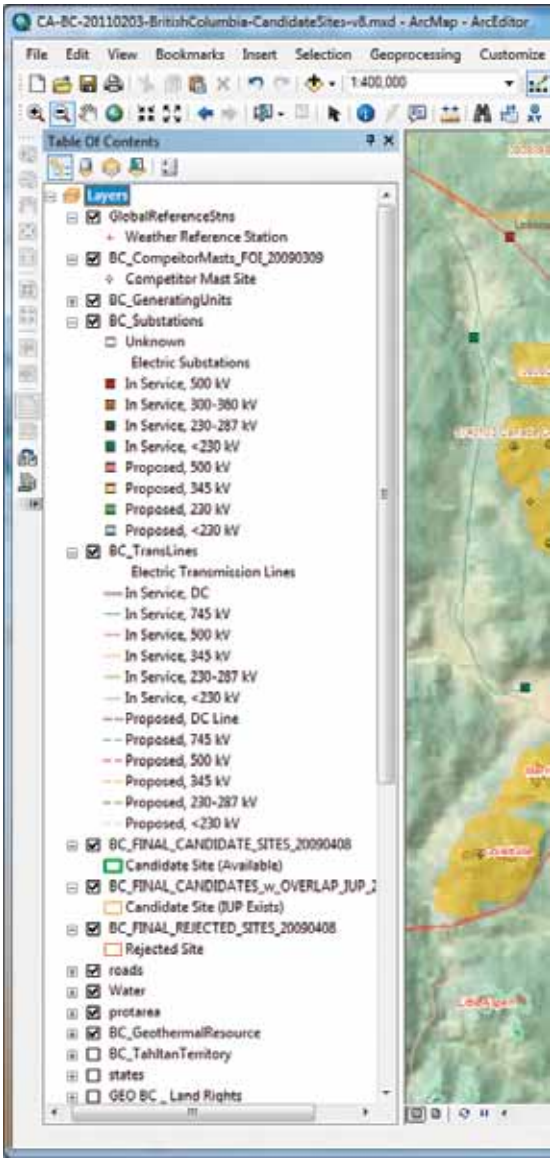
Finding optimal locations for development is a juggling act in which many often conflicting land-use issues need to be considered and balanced before a potential site is targeted. For example, it is essential that the grid connection be cost-effective for the size of the proposed development and that the site does not encroach on conservation areas or wetlands. Features such as roads and railways, residences, terrain and slope, and existing infrastructure must also be analyzed for currency, accuracy, and completeness to identify any potential conflicts or interference issues.

To conduct this analysis, Mainstream uses ArcGIS for Desktop and the ArcGIS Spatial Analyst extension. Through Esri technology, an array of datasets can be overlaid to quickly analyze information and determine the feasibility of selected sites. Sites are then chosen where the resource is adequate, grid access is available, and there is an abundance of suitable land. Map layers also enable Mainstream to identify areas considered undesirable for development such as protected ecosystems or national parks.

"Site evaluation involves an intensive research process that requires many questions to be answered: Where is the energy resource? What is the structure of the terrain? What are the constraining factors?" said Craig Weber, GIS specialist, Mainstream Renewable Power. "With GIS technology, we can answer these questions through a straightforward layering process and identify sites that are both technically appropriate and economically feasible."

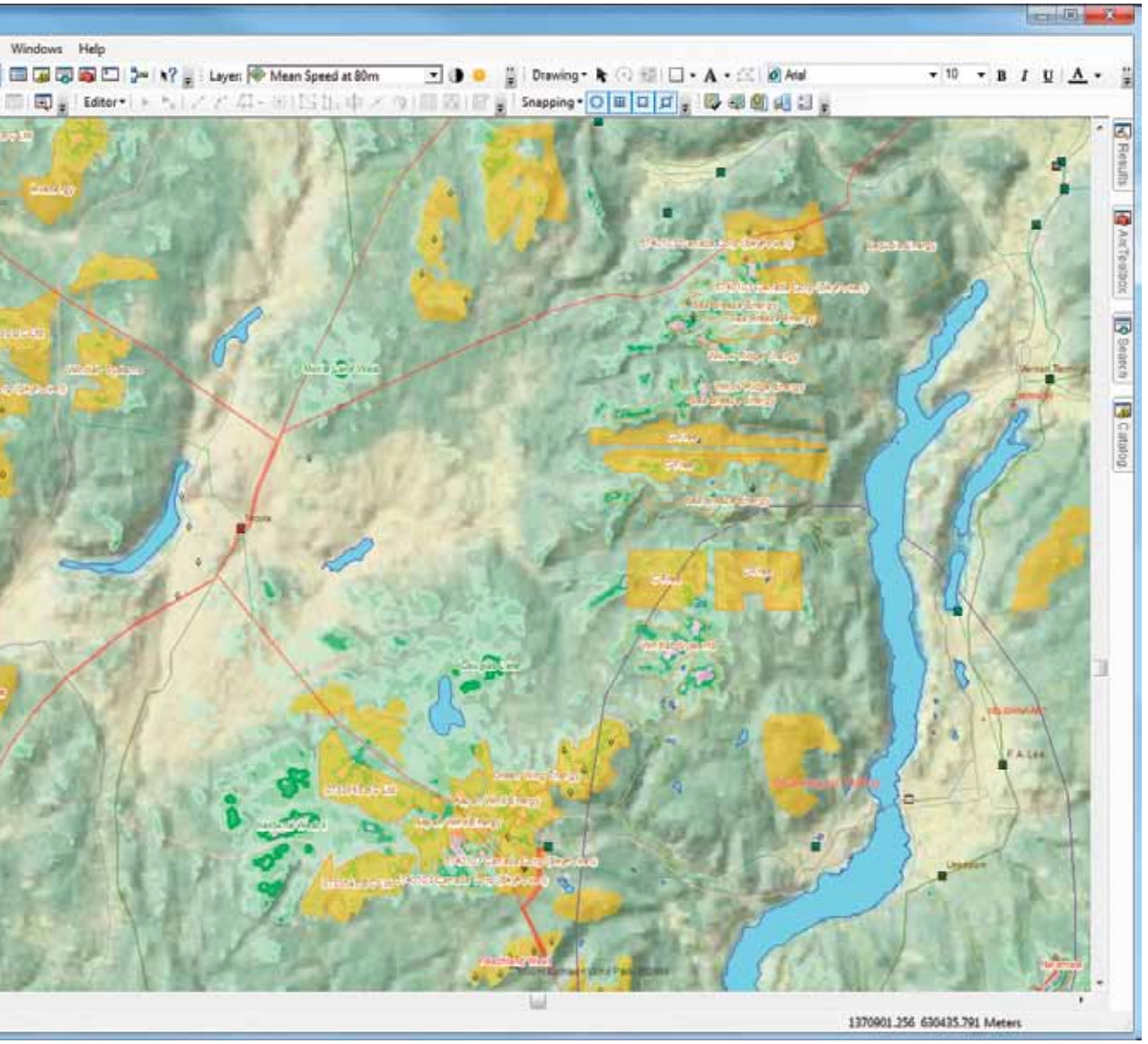
Powering Homes in the Prairies

In Kindersley, Saskatchewan, Mainstream has secured more than 2,000 acres of private agricultural land for a potential wind farm development. It is anticipated that this project, known as the Flaxcombe Wind Farm, could result in up to 60 wind turbines and potentially generate enough energy to power over 50,000 homes.



The site was originally selected for its wind resource and available grid capacity, and the project has since moved to the measurement phase. Esri technology is used to identify suitable locations for erecting meteorological masts and deploying measurement stations, providing a powerful planning tool for Mainstream's Energy Analysis Group.

The 3D analysis tools in ArcGIS are also used to conduct viewshed analysis. The visibility of new sites should be as unobtrusive as possible, with minimal impact on the landscape. For the public, authorities, and landowners involved in a project, this analysis can be very helpful because it reveals how the installation will look and will be integrated into the surrounding area.



← A potential development site is identified through ArcGIS.

"Without the participation of private landowners, our projects simply wouldn't move forward," said Weber. "Through meaningful maps, we can clearly communicate our due diligence to potential stakeholders, identify possible constraints, and assure landowners that all necessary steps have been taken to ensure the safe and successful development of a wind farm."

Within the next year, Flaxcombe will enter the environmental assessment phase of the project, and ArcGIS will be used to visualize bird and bat migration, as well as wildlife habitat and vegetation, to ensure the smallest environmental footprint. As the project advances, Mainstream will be reaching out to local stakeholders and community groups to solicit feedback about the project.

"We believe that wind energy is a great way to supplement the income of farmers and contribute to the economic development in rural communities," said Steven Xuereb, Flaxcombe Wind Farm project manager. "Typically, a project of this size would attract more than 100 construction jobs and up to five permanent technical jobs, as well as provide substantial tax revenue to the municipality."

To more effectively support project management around the globe, Mainstream is currently moving toward a server-based GIS environment. ArcGIS for Server has been selected because of its ability to integrate with the organization's document management system. The integration of these two systems will enable project managers, who may be unfamiliar with GIS, to maintain and update data in a controlled and user-friendly environment.

Visit esri.com/renewable.

Three Services, One GIS

By Arnisa Davis, GIS Project Manager, MLGW

Memphis Light, Gas and Water (MLGW), the United States' largest three-service municipal utility, serves nearly 430,000 customers and creates the land base for the entire Shelby County, Tennessee, area. MLGW has been utilizing GIS for more than 20 years to assist with meeting public safety goals and delivering reliable service to customers.

Most of the government agencies with which MLGW shares data also use Esri software. MLGW had to convert data from its legacy format to shapefile format to share its land-base data with the Fire and Police Departments and Emergency Management Agency (EMA). The difficulty and length of time required to translate the files limited data publication to one time per quarter. MLGW decided in December 2008 to purchase an enterprise license agreement with Esri and Telvent. MJ Harden, along with Ptarmigan and SSP Innovations, was selected for the implementation of the Esri/Telvent enterprise solution.

A project with such great magnitude presented many challenges for MLGW. Utility staff researched products for three years. To succeed, vision teams were created, made up of both nonmanagement and management employees. The GIS Vision team researched the benefits of implementing an enterprise GIS. Team members performed cost analysis, analyzed return on investment, and presented results to upper management. The vision teams empowered end users to take ownership of implementations. Company IT experts supported and provided guidance when needed. Many of the team members visited other utility companies that had implemented an enterprise solution. Requests for proposal were developed for software and implementation, with the vision team members to create all the business and functional requirements.

Land Implementation

In July 2010, MJ Harden converted and integrated the land information with an enterprise GIS. MJ Harden, Ptarmigan, and SSP Innovations designed a data model based on MLGW's needs. The data was converted from Enghouse CableCad to ArcGIS with an Oracle ArcSDE database and a Citrix implementation. MLGW is able to interface with many external applications from within ArcGIS. For example, MLGW interfaces with its customized Banner customer information system (CIS) to improve accuracy of addresses stored in both systems and accesses its document image system from within ArcGIS.

The utility also implemented Esri's ArcGIS Workflow Manager (formerly Job Tracking for ArcGIS [JTX]). MJ Harden created nine workflows for the Land Department. Workflow Manager allows the Land Department to track commercial and residential jobs that need addresses or other street information. The software allows operators to track project completion, identify which staff member worked the job, and target completion dates. It also allows the team leader to assign specific work request areas in the GIS based on highest needs. Once the other team members receive the work request by e-mail, the specific area is identified in ArcGIS.

MLGW also implemented the Telvent tools with versioning that allow staff to utilize a locator, an attribute editor, a QA/QC tool, Map Book Explorer, and stored displays. MLGW is able to create predefined map templates and generate maps based on grids with specific layers.

Staff can view imagery by connecting to ArcGIS Online and viewing world imagery, including data from Esri partner Pictometry.

Gas Implementation

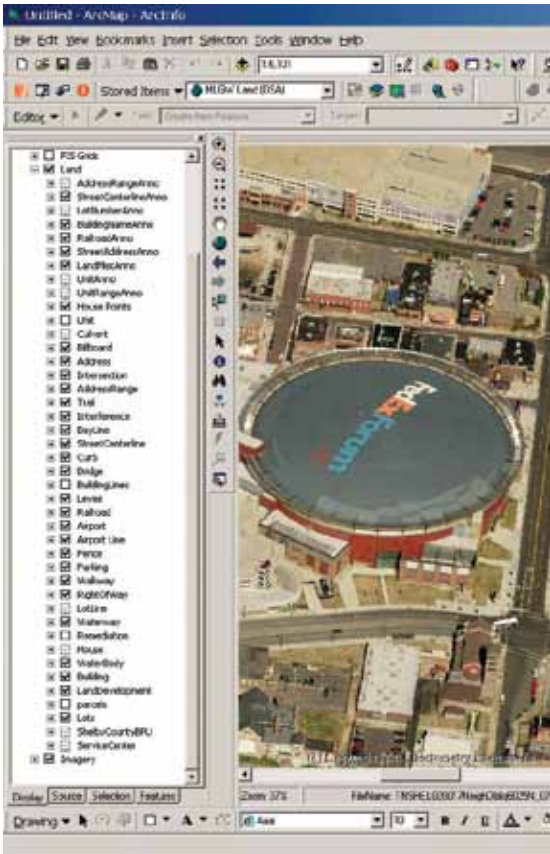
The implementation of gas and cathodic protection has been the most challenging of all the processes for MLGW. Nevertheless, gas was implemented in March 2011, and the GIS tools have provided users with the benefits of map books, stored displays, and tracing capabilities.

SSP Innovations created a custom cathodic protection trace that colors gas lines based on whether the line is a node or rectifier. The implementation of gas allowed MLGW to provide data for risk analysis for the Distribution Integrity Management Program (DIMP).

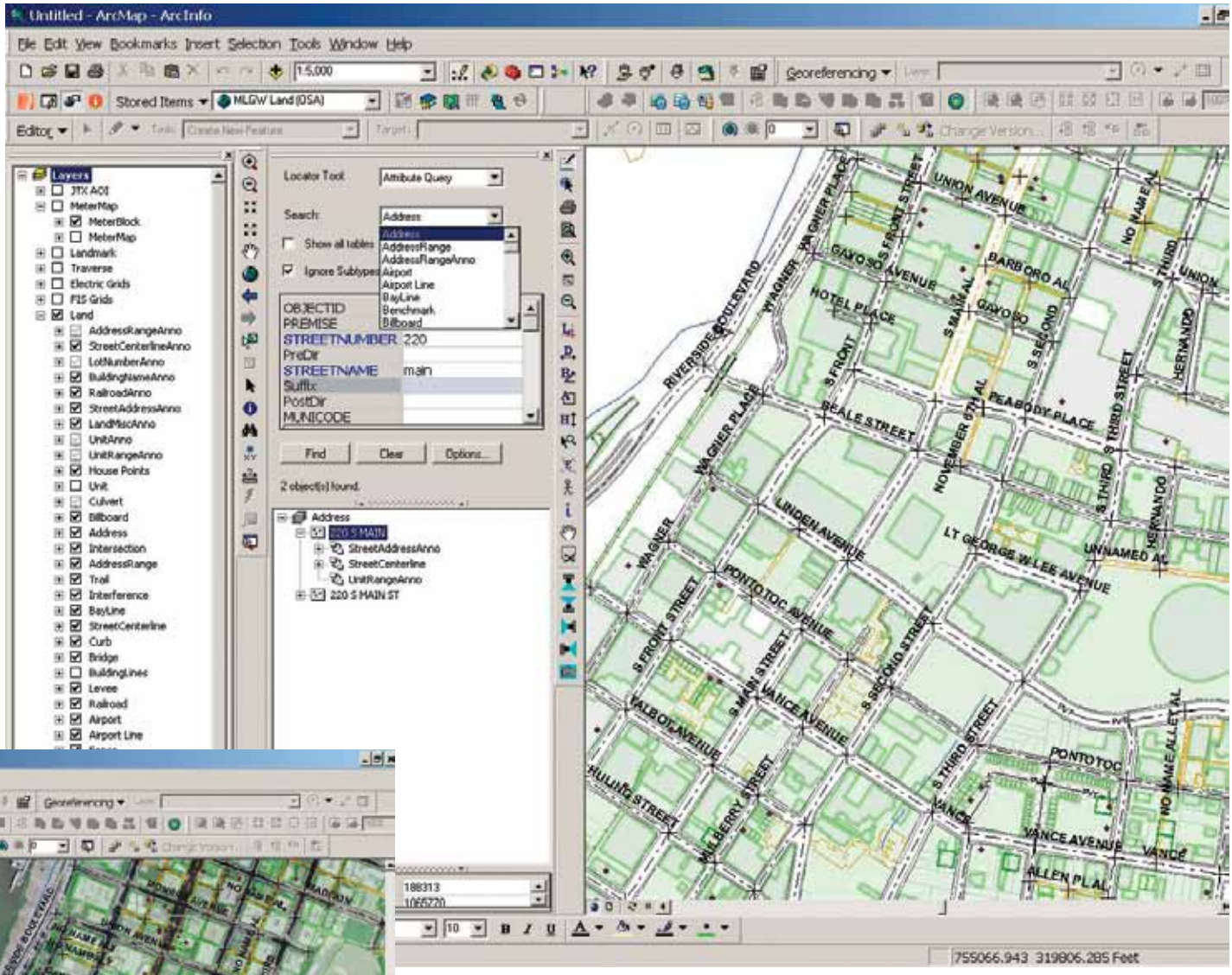
During the 100-year flood that Memphis experienced in May 2011, GIS helped staff view different data layers with the flood zones in the background. A temporary ArcGIS website was set up to allow crisis management and engineering teams to view gas, water, and electric facilities within different flood zone levels. ArcGIS was instrumental in providing data via the Internet to communicate risk to executives and the crisis management team.

Water Implementation

The water implementation was completed in August 2011 and introduced new interfaces to CIS consumption information and the creation of web reporting. Web reporting provides MLGW with an opportunity to view flow test and tap information from within the desktop application or via the web utilizing HTML pop-up windows. GIS also provides a way to create map books for wells near addresses and water tracing.



↑ Imagery and utility data can be viewed together.



↑ MLGW staff can search features using GIS tools.

What's Next?

The utility is currently working on converting the primary/secondary electric and streetlight features from CableCad to ArcGIS. Downtown network electric and telecom are being converted from paper or AutoCAD, to be implemented this year. MLGW also implemented ArcGIS for Server and ArcFM using Silverlight and a mobile application for field crews.

Through a joint venture with the University of Memphis, the utility is also creating a shared portal for the six-county Urban Area Security Initiative (UASI) to allow emergency agencies and police and fire departments to access critical infrastructure data from one central repository during an emergency or disaster.

Overall, Esri and Telvent provided MLGW with an enterprise GIS solution that allows the utility to share data with external customers and police, fire, EMA, and other emergency entities. Internal users are able to interface with other applications that store data in relational databases. MLGW staff are excited about the new tools that enterprise GIS will bring to the company.

Contact Arnisa Davis at adavis@mlgw.org.

Q&A with Sean Flatt

Sean Flatt is the GIS mapping coordinator for Middle Tennessee Natural Gas (MTNG). Recently, Esri writer Jessica Wyland interviewed him about his utility's use of GIS.

1. What attracted you and MTNG to GIS technology?

The challenges of managing an underground utility network have made GIS technology an incredibly beneficial tool for many natural gas utilities. At MTNG, we serve at least part of 21 different counties in rural middle Tennessee. With such a large service area, maintaining detailed maps of our system can be challenging. GIS provides the ability to efficiently and accurately map our natural gas system, as well as detailed basemaps. We are also facing the challenge of having to replace an experienced work force over the next several years. Many of our operations personnel have worked at MTNG for over 21 years and have tremendous knowledge of the industry and specifically our system. Although that knowledge cannot be replaced, by ensuring the most accurate and detailed information possible is available to our new employees, we hope to be able to continue to safely and efficiently provide natural gas service to our customers.

2. What do you plan to do with GIS?

We are currently using GIS technology in the planning and construction of all new mains, as a decision-making tool for our engineering department, and to perform ad hoc analysis for a number of company-wide objectives. All MTNG personnel have access to an internal web mapping application running the Flex Viewer API, which provides access to maps of our system and allows some basic GIS tools and functionality. In the coming year, we are planning to expand our GIS program into additional mobile applications. By utilizing ArcGIS Server and the ArcGIS Online platform, we are going to be sending our GIS applications into the field with Esri apps for the iPhone and iPad. Not only will this be a mobile access point for our maps and GIS data, but we will begin using these iPads to perform various reporting and data entry for our yearly system maintenance projects. This will provide a powerful tool in the field for our service personnel, allow us to easily monitor the progress of these projects, and also eliminate the need for manually entering this information into a database later. The ability for our end users to essentially be an active part of our GIS program and to be able to not only easily access our maps and data but also contribute information and data will open doors to a number of practical applications.

3. How did the small utility ELA make this possible?

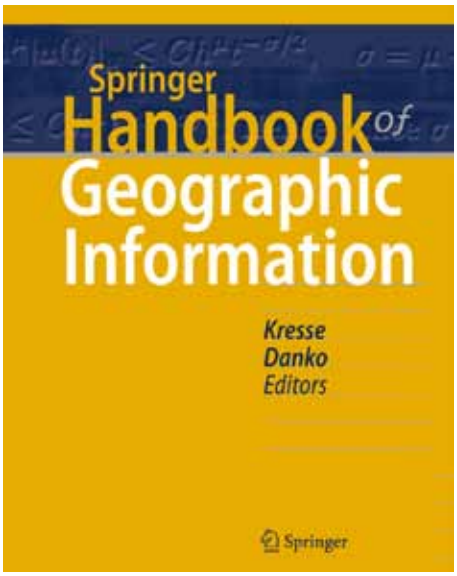
The ELA has helped our GIS program take a huge leap forward. With the ability to use the full suite of Esri software and extensions, we have been able to not only investigate but actually implement many products that we would have previously not even considered because of cost and scale. Not having to limit our number of GIS licenses also means we don't have to limit our number of GIS users. The ELA makes it possible to let even the most occasional user have access to the software and hopefully increase not only their familiarity with GIS but also their appreciation for the power of this technology within our organization.

Is the small utility ELA right for you? Find out at esri.com/suela.

Springer Handbook of Geographic Information

A newly released research and application-oriented text, *Springer Handbook of Geographic Information*, features a chapter written by Esri experts regarding the use of GIS for energy and utilities. The chapter was coauthored by Esri director of utility solutions Bill Meehan, former Esri gas and pipeline industry manager Rob Brook, and Esri writer Jessica Wyland.

Springer Handbook of Geographic Information is organized in three parts: Basics, Geographic Information, and Applications. The book is written for scientists at universities and industry as well as advanced and PhD students.



Springer Handbook of Geographic Information. Kresse, Wolfgang; Danko, David M. (Eds.), 1150 p., 688 illus., 116 tables. Springer-Verlag, Berlin, Heidelberg 2012.

Esri on the Road

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Esri International User Conference
July 23–27, 2012
San Diego, CA, USA
esri.com/uc

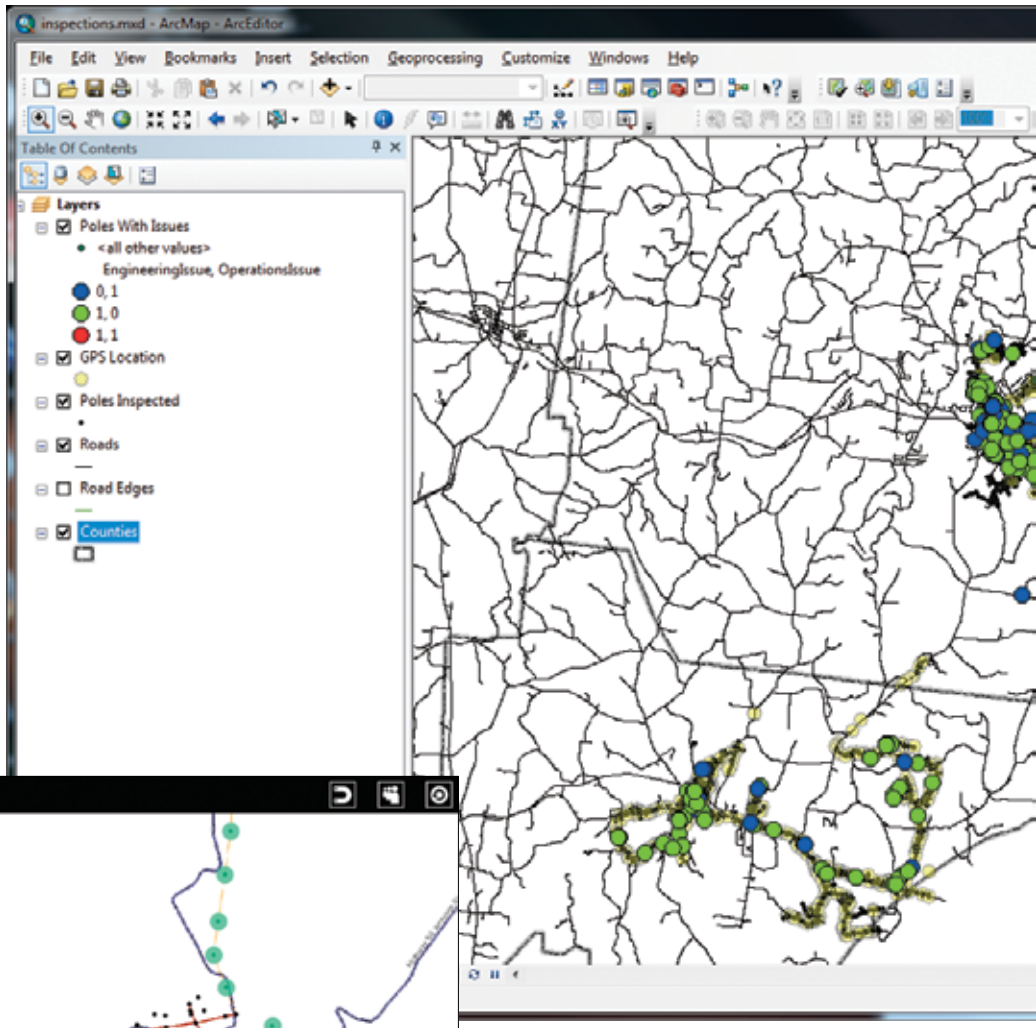
Field Inspections on an Android

By Jozef Kaslikowski, TCEMC

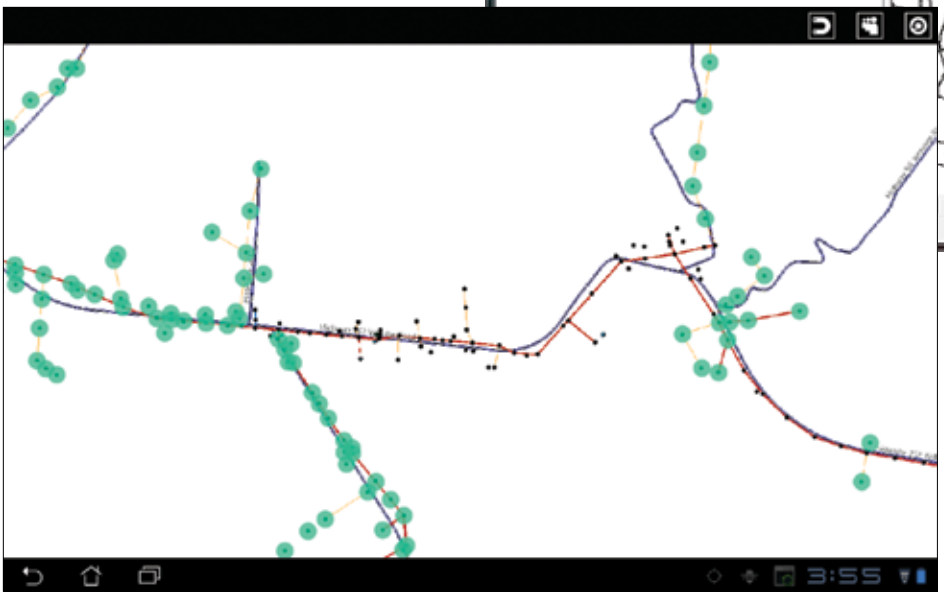
For several years, Tri-County Electric Membership Corporation (TCEMC), which serves more 53,000 members in central Tennessee and southern Kentucky, has been moving GIS into more areas of its operation. One of the last untouched processes was inspection of field equipment.

Until recently, inspections were tracked on paper. Staff would have to deal with lists of poles made at the substation or more recent printouts of circuits. The process was inefficient and frustrating to both the operations personnel and the engineering staff who had to interpret the notes. Often, follow-up trips were needed to identify the correct facilities with issues. This delayed the turnaround time on corrective actions. Given the large amount of data collected in this way, reporting and tracking were not practical.

The paper process endured due to one main reason: ease of use. Until now, mobile devices and software have been awkward and cumbersome to use. It can be difficult to train users who are unfamiliar with computers. The equipment tends to be expensive, not to mention the issues of battery life and data synchronization.



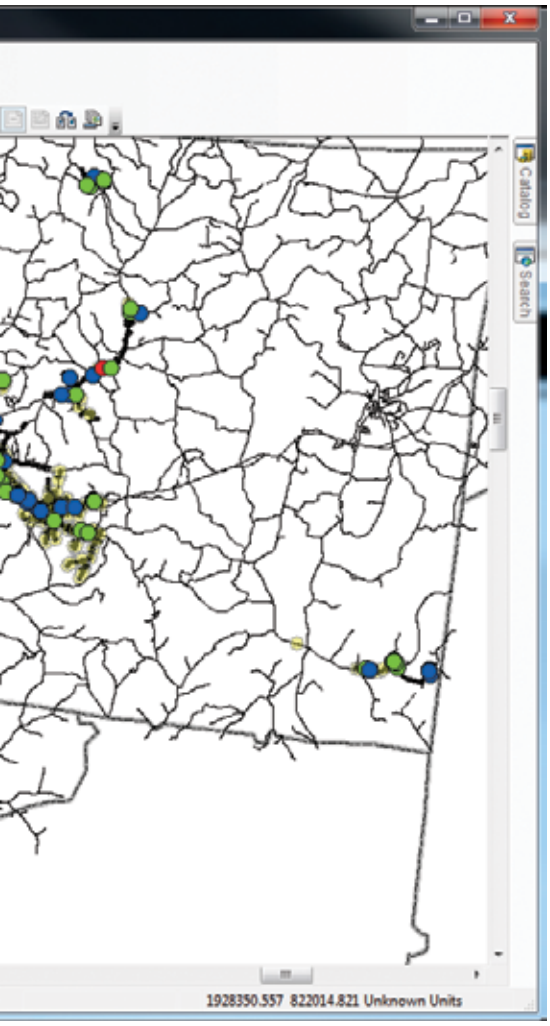
↑ Completed Pole Inspections with Issues Identified by Department



↑ Android Screen Shot of the Pole Inspection Form

However, the new iOS and Android tablets make an entirely new platform on which to build easy-to-use solutions that can be operated with two fingers and are cheaper than a laptop.

ArcGIS API for Android made it possible to package the entire basemap of TCEMC and all the equipment to be inspected into an Android tablet so that any member of the crew can perform inspections in the field. Each device contains a GPS to show current



location and cameras that can be used to document problem areas.

ArcGIS for Desktop is used to create a basemap, which is then converted to a tiled map cache by ArcGIS for Server. That information is then automatically downloaded to each tablet daily along with pending inspection requests. The inspections are overlaid on the basemap using touchable graphics in the inspection app. The user simply touches each piece of equipment that requires inspection, and the appropriate form is displayed to record the report. The inspector's name is logged for each inspection, as well as the last good GPS coordinate, the time the form was submitted, the current known attributes of the equipment, and any issues that were identified during the inspection. At the end of the day, when network connectivity is restored, the completed inspections are automatically uploaded to the GIS database.

The administration of the system is minimal, and every effort was made to automate tasks when possible. The pending inspections are identified by comparing GIS data to the list of inspections that have been recently completed. The routing of the identified problems to the appropriate department is done automatically.

A web-based application was created to manage the resultant corrective actions for the departments and to incorporate the information into the engineering staking package. Engineering staff can be assigned individual or bulk tasks based on territories. Operations supervisors can manage their corrective actions based on service areas. Correction tickets can be printed with an included map provided by the same ArcGIS for Server service that the tablets use. Each assignment is tracked, and additional notes can be added at any point. Finally, each department can separately resolve its own issues without affecting the other.

The completed inspections are stored in a SQL Server database that can be used for reporting and analysis. Since all the information is time stamped, the progress of the inspection cycle can be observed using the new query layer and time-aware layer features of ArcGIS. By storing the equipment attributes at the time of inspection, users can see movements of GIS data as well as changes in equipment between inspection cycles.

TCEMC has taken advantage of newly available hardware and Esri's APIs to provide an easy-to-use yet powerful inspection tracking system. By building on common consumer-based equipment, TCEMC has many choices of vendors and several different price points available. The advantage of the Android-based solution is the freedom of custom app deployment and the use of a standard Windows PC for development.

Contact Jozef Kaslikowski at jkaslikowski@tcemc.org.

Connecting ArcGIS to the Android Platform

Free App Now Available

Google Android users can now access data and mapping capabilities on their smartphones with the ArcGIS for Android application, which lets users find and share maps as well as deploy GIS data and functionality on Android devices. The free app is now available and can be downloaded directly from Google play Amazon Appstore.

ArcGIS for Android is built on ArcGIS Runtime Software Developer Kit (SDK). This SDK lets developers create custom, spatially enabled applications for Android devices and is designed to use web services available from ArcGIS. ArcGIS Runtime SDK for Android is now available for free and can be downloaded from the ArcGIS Resource Center.

Visit esri.com/android.

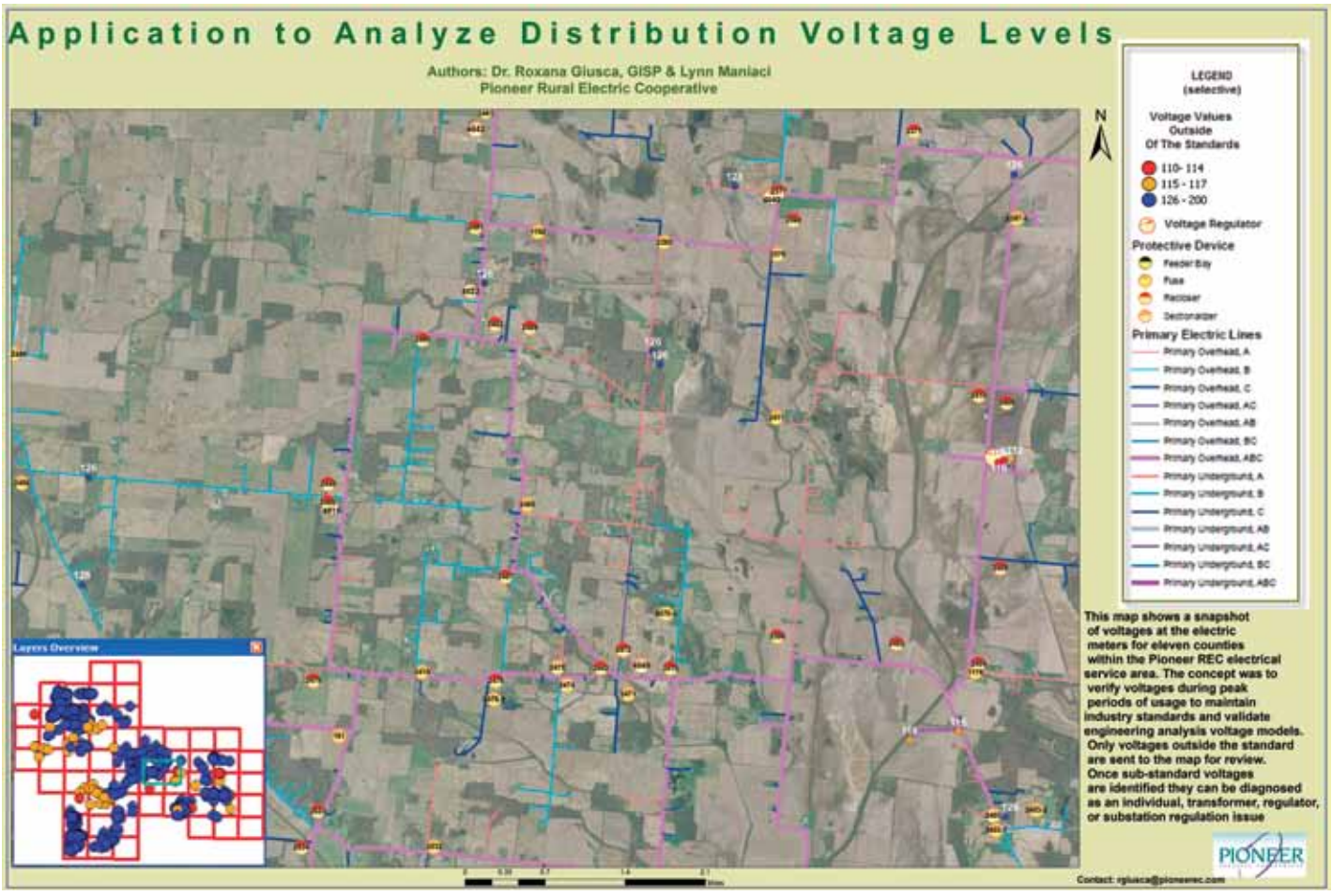
Accolades to the Map Gallery Winner

The winner of the 2011 Esri Electric and Gas GIS Conference Map Gallery was *Application to Analyze Distribution Voltage Levels*, created by Roxana Giusca and Lynn Maniaci of Pioneer Rural Electric Cooperative in Piqua, Ohio.

The map shows a snapshot of voltages at electric meters for 11 counties within the Pioneer Rural Electric Cooperative service area. The concept was to verify voltages during peak periods of usage to maintain industry standards and validate engineering analysis voltage modes.

"Without the ability to analyze voltages on a large scale, service personnel would have had to make several inspections documenting voltages in the area to create an overview of the conditions," said Maniaci, substation and automation engineer at Pioneer Rural Electric Cooperative. "Utilizing GIS technology has greatly improved the efficiency of our field crews and enhanced the reliability to our members."

Contact Roxana Giusca at rgiusca@pioneerec.com.



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- Follow Esri's utility industry writer Jessica Wyland: @EnergyGIS.
- Follow Esri's director of utility solutions Bill Meehan: @bill_meehan.

Join the EGUG LinkedIn group.

Spring Lineup on Esri TV

Tune in to the latest videos, such as those from Esri describing step-by-step instructions for using arcgis.com. Visit youtube.com/esritv.

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Live training seminars bring the GIS instruction you need to your desktop. Technical experts lead these hour-long sessions, which are streamed live. Should you miss the interactive presentation, you can access the recording online. Visit training.esri.com for more information.

Webinars

Listen to a new series of monthly EGUG webinars with upcoming topics that include mobile GIS, distribution integrity management program (DIMP), and networks. To learn more, visit esri.com/egug and click the Webinar Series link.

Electric and Gas Resource Center

The Electric and Gas resource center is the place where you can find ArcGIS maps and apps that help you manage geographic information, visualize trends, and publish great web maps. Visit resources.arcgis.com and click the Electric and Gas link.

"The dashboard provides more information to our employees and is much faster and easier to use than our existing digital maps."

Todd Harrington, Union Power Cooperative

Esri and made it work for us," said Harrington.

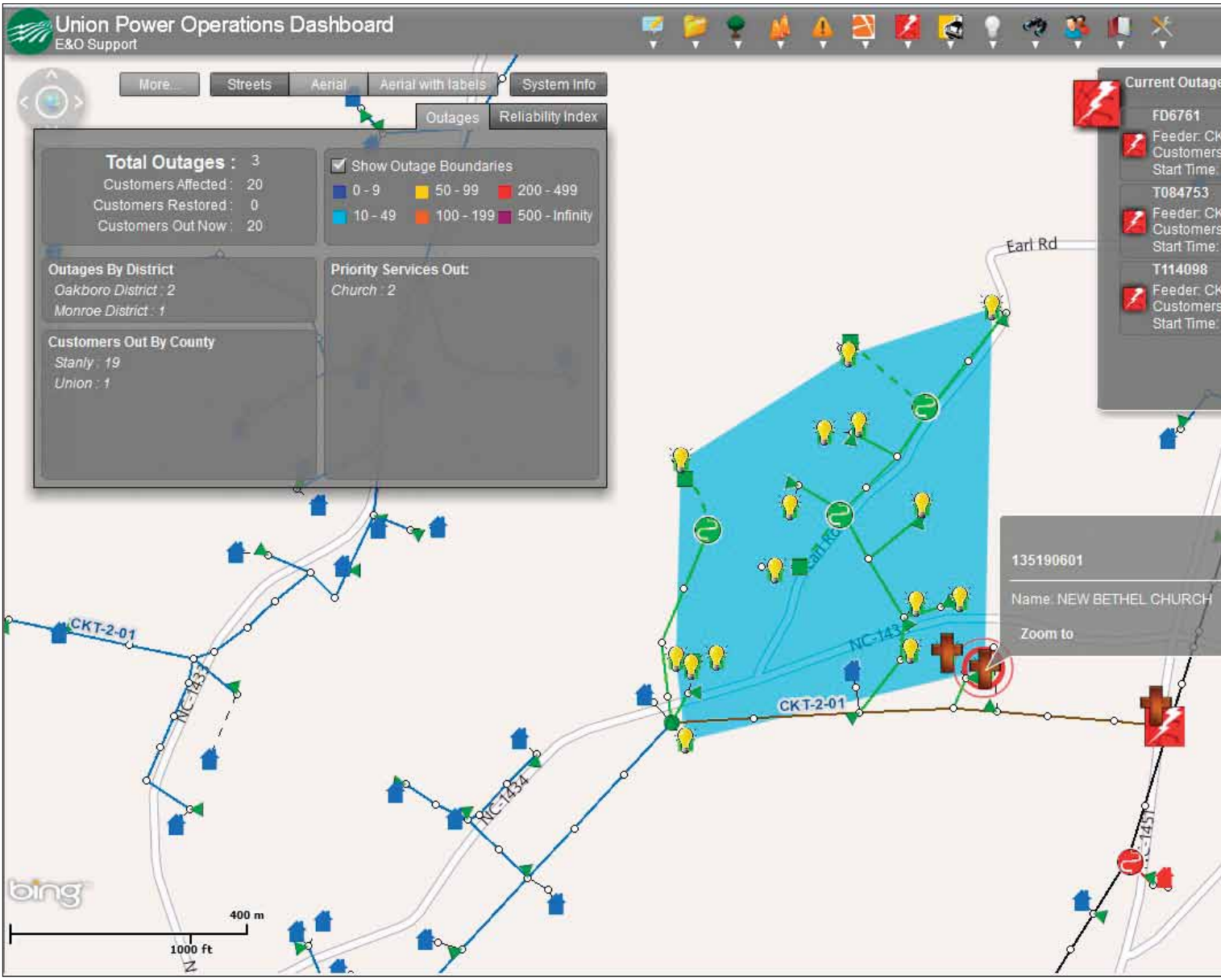
"We added data from Oracle on the customer information side and automated metering data in an Oracle database, Milsoft data on SQL Server, and some GIS data on SQL Server along with Esri's web services."

So far, Harrington said, management is very excited and pleased with the dashboard.

"We learned that the dashboard not only provided more information to our employees but was much faster and easier to use than our existing digital maps," said Harrington. "It has helped us discover meter tampering a lot faster. Within the first week the meter tampering widget was live, it recovered over $3,000 in meter tampering that we may have never recovered or [would have] taken the next billing cycle to discover."

The dashboard has also saved the utility a considerable amount of time. Since everything is automated, personnel are no longer tied up with the time-consuming tasks of extracting data, cleaning it up, and producing maps.

Harrington has trained field service personnel, all customer service representatives, and



↑ Using the dashboard, Union Power can find faulty equipment before it fails and causes an unplanned outage.

dispatchers on the dashboard. He also plans to train the linemen and set up data connection in the crew's trucks.

The utility community has responded with excitement to Union Power Operations Dashboard. Last year, Harrington spoke about it at the national Esri Electric and Gas User Conference. He and Gross also presented their work at the TechAdvantage Conference in conjunction with the National Rural Electric Cooperative Association's annual meeting.

"Based on feedback from other utilities, we have developed some very innovative concepts," Gross said. "This project will continue to evolve, adding value to our members as it places the efficiency of advanced technology at employees' fingertips."

← Union Power Operations Dashboard provides an outage overview that keeps management, the communications department, and customer service representatives aware of how many and which customers are out of power.

Watch the Video:

Electric Distribution Operations Dashboard Template

An electric or gas operations manager can use the Electric Distribution Operations Dashboard template to quickly answer questions. What is the current operational status of the network? What incidents or outages are occurring, and where? Are there any external environmental events that can impact operations? The template can be used as a guide for implementing a common operating picture to improve operational decision making in response to outages and other service-impacting events.

Check out the video and download the template at esri.com/dashboardvideo.

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