Energy Currents

ESRI • Fall 2004 GIS for Energy

GIS Solutions for Regulatory Compliance

Power companies are required to comply with environmental regulations, inspection directives, dig programs, tax laws, and many other agency mandates. Companies can leverage their databases with GIS to meet the demands of these mandates and to provide regulatory agencies with compliance information. Regulatory compliance mapping with GIS offers accurate calculations, provides flexibility to adapt to regulatory changes, and streamlines compliance processes. Furthermore, work processes linked to GIS applications include required data so that composite and historic reports can be created quickly and presented to regulatory bodies as text, tables, maps, and other formats.

Vegetation Management

The Federal Energy Regulatory Commission issued a Vegetation Management Reporting Order that is applicable to transmission owners, operators, and controllers. This is in response to the U.S.–Canada Task Force report regarding the August 14, 2003, blackout, which was caused by contact between transmission lines and overgrown vegetation that encroached into the required clearance height for the lines. The commission concludes that current industry standards are inadequate and must be improved. The report calls for the oversight and enforcement of utility vegetation management activities. Pursuant to Section 311 of the Federal Power Act, the commission requires that all transmission providers that own, control, or operate designated transmission facilities in the lower 48 states submit vegetation management reports with specified information.

Analysis—Various GIS consulting firms have created GIS applications for vegetation management. Custom toolbars built for mobile ArcPad software help field crews record vegetation inventory and enter management responses into a database. Work orders can be transmitted. Schedules for vegetation removal and planting are linked to GIS for work processes. Vegetation management can be monitored with temporal analysis to determine effectiveness. Applications for reporting have been designed and can be customized for automatic vegetation reporting. Tree trimming contractors can interact with the power company's GIS database online to do bidding, see requirements, and to record work done. Their work responses can be accessed for compliance reporting.

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Special Achievement in GIS

ESRI proudly gives recognition to the following SAG award winners in the electric and gas industries.

Abu Dhabi Water & Electricity Authority (ADWEA), United Arab Emirates
Duke Energy Field Services, Colorado
Electricite Du Liban, Lebanon
Empresa de Servicious Públicos de Herecia SA (ESPH SA), Costa Rica
Laurens Electric, South Carolina
NSTAR, Massachusetts
Osaka Gas Company, Japan
Petrobras UNGN, Brazil
Svenska Kraftnät, Sweden
Transco, United Kingdom
Truckee Donner Public Utility District, California

Every year the Special Achievement in GIS (SAG) award honors an elite group

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In This Issue

ESRI on the Road

APPA BroadBand
October 10–13, 2004
San Francisco, California
www.appanet.org

ESRI Electric and Gas User Group (EGUG) 2004
October 10–14, 2004
Williamsburg, Virginia
www.esri.com/egug

Latin American ESRI User Conference
October 13–15, 2004
Panama City, Panama

European ESRI User Conference 2004
November 8–10, 2004
Copenhagen, Denmark
www.euc2004.dk

AdvanCES
November 2004
Location to be announced
www.ces.com

Damage Prevention 2004
November 30–December 1, 2004
Grapevine, Texas
www.damageprevention.com

Seventh Annual Middle East User Conference
December 7–9, 2004
Dubai, United Arab Emirates

Distributech
January 25–29, 2005
San Diego, California
www.distributech.com

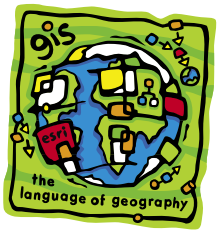
Miner & Miner User Group Meeting
February 1–3, 2005
Fort Collins, Colorado
www.miner.com

NRECA Annual Meeting
February 27–March 2, 2005
San Diego, California
www.nreca.org/nreca/Resources/Calendar/FutureAnnualMeetings

GITA
March 6–9, 2005
Denver, Colorado
www.gita.org/events/annual/28/index.html

To register for ESRI events, visit www.esri.com/events.

User Conference 2004—GIS, the Language of Geography



They came from all around the planet to listen and join in the language of geography at the 24th Annual ESRI User Conference, held in San Diego, California, this August. Many people from many lands and representing many industries came together to learn from others and to share their knowledge in GIS dialog. Both new and expert users of GIS software attended technical workshops, user presentations, and software demonstrations.

"We live in a changing world," said Jack Dangermond, president of ESRI, at the conference plenary. "We need more understanding and more collaboration. The tools of GIS and geography give us a platform to achieve this. GIS is the language of geography that integrates structures, organizes work flow plans, and processes decision making. It is a system for concept collaboration that builds common understanding by leveraging our common knowledge." Sharing in this global dialog, conference attendees were inspired to better their communities with GIS.

Many opportunities for electric and gas organization GIS users were offered. ESRI's electric and gas industry professionals, Mitch Garnett, Bill Meehan and RouteSmart's Steve Pasquini, presented a preconference seminar, *Expanding the Benefits of GIS for Utilities.* Utility executives attending the Senior Executive Leadership seminar were given ideas for managing geospatial activities, getting value from GIS as an enterprise asset and developing policy-related geospatial data, initiatives, and partnerships. Eugene Zimon, senior vice president and CIO for NSTAR, presented his ideas for leveraging GIS as an enterprise asset. Electric and gas GIS software users met together at the Electric and Gas User Group luncheon to discuss the themes and goals for the group's 2004–2005 efforts.

Users and business partners presented papers at the conference such as Utility Facility Siting and Management, Utility GIS Goes to the Field, and Underground Utility Management Made Better With GIS. The Electric and Gas Utility island in the exhibition hall offered demonstrations of how ArcGIS helps provide solutions for field inspections, generation of schematics, and new features in ArcGIS 9. Users met with ESRI business partners, showed their maps in the Map Gallery and, most important, developed professional networks that will serve to improve their companies' information technology. Technical workshops provided detailed information about how to make the best use of ESRI software. At the exhibit pavilion, users visited with ESRI business partners to learn about the latest in technology solutions useful for their own GIS projects.

After the conference paper sessions and PowerPoint presentations will be available online. To learn more, visit ESRI's Web site at www.esri.com.

Special thanks to the following User Conference sponsors of electric and gas industry events:

- ABB
- Advantica
- Enspiria
- ESC, Inc.
- MESA Solutions
- Miner & Miner
- MiniMax
- RouteSmart
- Safe Software
- Tadpole–Cartesia

Find Out About Nearby GIS Events

Do you want to learn more about GIS technology? A new service, available at no charge, will notify you when seminars, conferences, trade shows, special training sessions, and other GIS-related events are planned in your area. Subscribe to **My ESRI News** and receive a concise e-mail announcement containing all the pertinent details about events in your region. Visit www.esri.com/myesrinews to sign up for this handy service.

ESRI Enhances Support for Enterprise Customers

Continually striving to solve customers better, ESRI recently announced the availability of an expanded support program for its enterprise users. The ESRI Enterprise Advantage Program (EEAP) is designed to meet the unique needs of ESRI's U.S.-based enterprise GIS customers. In addition to account management support, the program offers customers focused technical management, a flexible spending program for services, training and premium support, and other assistance.

EEAP was developed for customers who use GIS to share geospatial data and services across departments. In direct response to needs expressed by customers, EEAP provides a structured program for customers to engage ESRI services, training, and support as part of developing, implementing, and monitoring an overall GIS strategy.

The key program components are

- The assignment of an ESRI regional account manager and technical advisor(s)
- The provision of 100 learning and services credits
- An annual account and GIS strategy review, conducted in Redlands, California, and attended by senior ESRI technical and industry staff
- GIS environment
- Quarterly enterprise-related Webcasts, developed specifically for ESRI enterprise GIS customers

Using EEAP learning and services credits, customers can create a highly customized solution that fulfills their organization's technical and business objectives. With each learning and services credit, customers can redeem one or more for the following types of ESRI resources:

- Two hours of technical professional services
- Two hours of architectural consulting services
- Four hours of data conversion professional services
- Two hours of access to ESRI's premium technical support
- One day of instructor-led training for one person at an ESRI office
- One day's use of the ESRI Applications Development Center in Redlands, California
- $480 of Virtual Campus training

As part of the program, the account manager and technical advisor will work with their customer to develop a high-level work program for the year that is aligned with the GIS strategy, identifying key project areas and utilizing targeted ESRI consulting domain expertise.

ESRI believes the Enterprise Advantage Program will greatly help organizations to proactively address their enterprise GIS implementation needs and facilitate access to appropriate ESRI resources throughout the process. Furthermore, as an annual subscription-based program, it will enable customers to adjust how they wish to utilize the program as their GIS strategy unfolds.

For more information on the ESRI Enterprise Advantage Program, contact your ESRI account manager at your local ESRI regional office or Mark Causley, Business Development manager, Enterprise Implementation Services, ESRI Professional Services (e-mail: mcausley@esri.com) or visit www.esri.com/eeap on the Web.

GIS Educational Opportunities

ArcGIS 9 has rolled out and its time to catch up on the latest features and tools.

Instructor-Led Training

ESRI's instructor-led training provides you with classroom hands-on instruction. Here are a few of the courses.

What's New in ArcGIS 9

Unwrap the new functionality available in ArcGIS 9 including the new geoprocessing environment, enhancements to the geodatabase, and the new functionality found in various ArcGIS software extensions. The first half of this course focuses on the geoprocessing environment and the hundreds of new tools available to users. Participants learn how to access these tools in a variety of ways such as through models, scripts, and a new command line environment. Enhancements to the geodatabase, such as XML import/export and the ability to store raster data, are discussed. The ArcGIS 3D Analyst and Maplex for ArcGIS extensions, showcasing the new three-dimensional symbols and ArcGlobe and labeling enhancements, are also discussed.

Working with ArcGIS Schematics

This course focuses on the configuration of the workspace parameters file including how to create schematic graphic objects and drawings, new document types, how to customize behaviors, and how to choose the appropriate running mode. Participants will learn how to query and represent spatial and nonspatial objects, as well as highlight the dynamic link between the schematic view and ArcMap, and represent inside plant schematics.

ESRI has many other instructor-led courses. See the ESRI Schedule of Classes and register for a course at www.esri.com/training.

Online Courses

Take GIS courses online at the ESRI Virtual Campus. We offer courses that teach the latest GIS technology as well as how different industries, such as gas and electricity, use GIS and the science of geographic information. The Virtual Campus Library offers the most comprehensive guide to GIS literature on the Internet. Here are a few of the online courses.

- Learning ArcGIS 9
- Introduction to the Geodatabase
- GIS Planning Basics
- Getting Started with Geoprocessing
- What's New in ArcGIS 9 Labeling and Annotation
- ArcIMS

Visit the ESRI Virtual Campus Web site for more course listings and registration information at http://campus.esri.com.

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Special Achievement in GIS

of organizations that have embraced GIS technology to better serve our world. The gas and electric industry made outstanding strides in applying GIS in innovative ways and in practical applications.

Osaka Gas Company, Ltd., significantly reduced its operating costs by using GIS to improve its business systems. Using GIS to keep the pipeline network upgraded, the company distributes maps online. The facilities gas data model has been a useful tool.

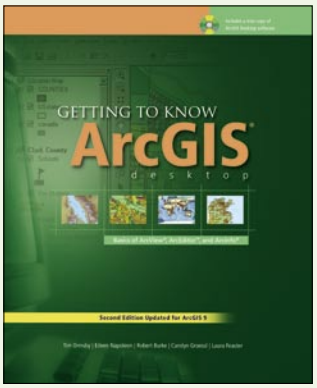
Petrobras UNGN of Brazil designed a GIS solution that supports 2,227 km of new gas pipelines for its expansion project. GIS is integrated with logistics engineering and corporate engineering. Various departments, construction and assembling contractors, and a transportation company access the system. The system offers staff a tool for spatial analysis and route design.

Svenska Kraftnät of Sweden uses its GIS, Gisela, to spatially depict the Swedish national grid including substations, lines, and poles. The grid is portrayed in both a geographic and schematic view. The database contains facilities and all landowners and buildings within 100 meters from a line, information that is useful to builders. Gisela provides easy access to drawing files and component information in asset management. Staff members who once responded to landowners' inquiries in days now do so in minutes. Every employee has computer access to accurate facility maps and can quickly search the database for the information they need. ESRI technology includes ArcSDE 8.3 and ArcIMS 4.

Truckee Donner Public Utility District, located in northern California, continues to extend its GIS applications. These have reduced work process and saved time and money. For example, a Fiber Network Engineering tool estimates costs and work of projects. An outage management system provides outage event information to both customers and employees. Future endeavors will include integration of a work management system with current GIS and billing databases.

Congratulations to all SAG award winners for their exceptional work.

Getting to Know ArcGIS Desktop, Second Edition



Getting to Know ArcGIS Desktop, Second Edition is a comprehensive update to this best-selling workbook. The second edition revises existing material and adds new exercises based on ArcGIS Desktop version 9, the latest release of the world's leading geographic information systems (GIS) software.

Each chapter in *Getting to Know ArcGIS Desktop, Second Edition* contains conceptual material followed by scripted software exercises. Readers acquire skills in a variety of areas–map symbology, data overlay, map projection, and data conversion, to name a few–as they make maps and analyze geographic data. The book culminates with a set of spatial modeling exercises using the ModelBuilder technology of ArcGIS version 9. ModelBuilder is a graphical environment for representing, automating, and solving spatial analysis problems.

Its broad scope, simple style, and practical orientation make *Getting to Know ArcGIS Desktop, Second Edition* an ideal classroom text and an excellent resource for those learning GIS on their own. A trial version of ArcGIS Desktop version 9 and sample geographic data is included with the book. No prior knowledge of GIS or GIS software is needed.

Please Note:
Trial Software: Included with the book is a fully functioning 180-day trial version of ArcView 9 software on CD-ROM, as well as a CD of data for working through the book's exercises.
Operating System(OS): The single-use ArcGIS Demo Edition software on the CD in this edition requires the Microsoft® Windows® XP, Windows 2000, or Windows NT® (Service Pack 6a) operating system.
Hardware requirements: A minimum 800 MHz processing speed; 256 MB RAM; 800 MB hard disk space, including 50 MB on the operating system drive; an additional 225 MB hard disk space is required for the exercise data.

ISBN: 158948083X
588 Pages $59.95
Order online directly from the ESRI Store at **www.esri.com/shop** or call 1-800-447-9778.

EGUG 2004

October 10–14, 2004

The ESRI Electric and Gas User Group (EGUG) Meeting on October 10–14, 2004 will be held in Williamsburg, Virginia. This event, hosted by Dominion, provides a forum for ESRI energy utility users to discus important issues, explore solutions, and exchange information on ways GIS technology can help solve complex problems within the industry.

- Attend presentations given by GIS professionals from around the country.
- Interact with your peers.
- See state-of-the-art hardware and software solutions at the GIS Solutions EXPO.
- Learn about new technology.

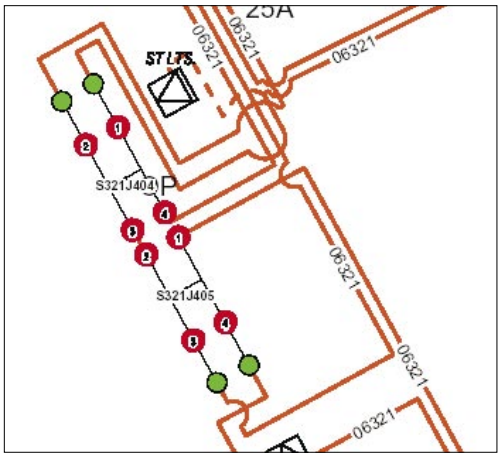
ESRI thanks this year's EGUG platinum sponsors Advantica, GDT, and Origin Geosystems and gold sponsors Itron, Miner & Miner, and MiniMax.

Watch for more information about EGUG 2005 in Lake Tahoe, California, hosted by Truckee Donner PUD and EGUG 2006 in Albuquerque, New Mexico, hosted by Public Service Company of New Mexico.

ESRI's Electric and Gas Web site provides information about joining EGUG and registering for EGUG 2004. To learn more about EGUG and receive registration information, visit www.esri.com/egug.

Electric and Gas GIS Screen Shots Wanted

ESRI software users make the best maps in the electric and gas industry. Let us show them to the world. Simply send us your finished GIS gas and electric maps. If you have designed a handy drop-down menu or tool, include it in the screen shot as well. Screen shots should be at least 96 dpi and legible on a quarter of a magazine page or readable on one view of the computer screen. Save them in .tif or .bmp files. A 10- to 15-word caption, the name of the company, and the name of the mapmaker should accompany the screen shot. Please send screen shots to Roxanne Cox–Drake at rcoxdrake@esri.com.



EGUG 2004 Officers

President, Ian Fitzgerald—Truckee Donner PUD
Vice President, Cindi Salas—CenterPoint Energy
Conference Co-Chairs, Robert Wright and David Miller—Dominion

Join EGUG

The Electric Gas User Group (EGUG) is an international special interest group for utility industry GIS enthusiasts. This community offers you a network of information on how to get the most out of your GIS for your business. Energy companies from around the world meet throughout the year to share how their GIS is helping them succeed and the lessons they have learned along the way. This community offers technological and policy insight and creates a forum for developing ideas and sharing concerns. Dominion hosts EGUG 2004 on October 10–14, in Williamsburg, Virginia, at the Williamsburg Lodge. Joining EGUG is easy and free. Sign up at www.esri.com/electricgas.

EGUG Conference Virtual Booth

Can't make it to the EGUG conference this year? Stay up on daily conference news by visiting ESRI's EGUG virtual booth. Read a day-to-day account of the EGUG conference in Williamsburg as it is happening at www.esri.com/electricgas.

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GIS Solutions for Regulatory Compliance

Utility Land Survey Regulations

The Federal Energy Regulatory Commission Department of Energy requires that transmission companies submitting an application for a permit or licenses for waterpower project facilities use GIS maps when submitting applications. Also, hydrogeneration companies must survey their land and provide results in a GIS format (see CFR 18 Parts 2, 4, 9, 16, 375, and 385). The application must include a text file describing the map projection used (e.g., UTM, State Plane, Decimal Degrees), the map datum (e.g., North American 27, North American 83), and the units of measurement (e.g., feet, meters, miles). Three sets of the maps must be submitted on CD or other appropriate electronic media.

Analysis—By using GIS, surveyors can integrate survey measurements into a geodatabase, improve the accuracy of mapped features, map new features based on surveyed points, organize survey data in projects, and maintain data about and report on the spatial accuracy of surveyed points. Information for permit and license requirements can be extracted for reporting including metadata, projection information, and data sources. Web-enabled GIS makes it possible to submit reports online and, in turn, enables the applicant to inquire about the status of the application.

Accounting Standards

The Governmental Accounting Standards Board (GASB) has issued new guidelines that will fundamentally change the way local government's cities and counties, including public works and utilities, report their finances. Financial statements will need to contain more detailed information about the full cost of providing services including the infrastructure assets of water and sewer systems, roads, bridges, storm water systems, tunnels, and so forth. Utilities and public works agencies will be challenged to come up with acceptable methodologies and practices for infrastructure maintenance to support the reporting and depreciation requirements of GASB 34 as well as become increasingly more accountable for the conditions of their infrastructure assets.

Analysis—Ultimately, the infrastructure asset data collected, managed, and maintained by GIS and maintenance management systems should be integrated with a local government's financial management system. Together, these systems can provide the needed infrastructure asset, maintenance, and financial data to help cities and counties comply with GASB 34. Maintenance history information generated will be valuable data for use in determining budgets, planning capital improvements, and developing preventive/predictive maintenance activities. GIS facilitates collecting, retrieving, and maintaining this information for analysis by identifying specific infrastructure assets, locations, or attributes. Once maintenance history and infrastructure asset inventory data is available through GIS, it can also be reviewed in conjunction with other data sets found in GIS. If agencies want to use detailed financial information frequently as an integral management tool, they should consider using GASB 34 as an opportunity to develop both advanced technical solutions (i.e., geographic information systems and maintenance management systems) and improve infrastructure asset maintenance practices. (GASB analysis provided by David DiSera, Grey Haupt, and Sandy Scott of EMA Inc.)

Inspection and Maintenance Regulations

State Level

States have individual regulations. GIS compliance solutions can be modified to meet specific inspection and maintenance regulations. California Public Utilities Commission decisions established inspection cycles and record keeping requirements for utility distribution equipment, which are contained in General Order 165. Utilities are required to patrol their systems once a year in urban areas or once every two years in rural areas. Utilities must conduct detailed inspections every three–five years, depending on the type of equipment. For detailed inspections, utilities' records must specify the condition of inspected equipment, any problems found, and a scheduled date for corrective action. The utility must submit an annual report summarizing inspections made, equipment condition observed, and repairs made.

Analysis—Use GIS to create a compliance database that stores jurisdiction, inspection periods, compliance type, follow-up requirements, and measurement ranges. This is used both to initiate inspection work schedules and maintain inspection data. The database is useful for facilities management and is drawn upon to compile data for inspection reporting. By building a compliance layer into the GIS application, GIS computes which poles have been inspected and when, outcomes, and pole inventory. By linking to work order database information, fieldwork done and work scheduled for each pole by type or work and date can be spatially displayed and reports created in spatial display, tables, and aggregate reports.

Pipeline Safety Rules

The Department of Transportation's Research and Special Programs Administration, Office of Pipeline Safety has issued new regulations

on pipeline integrity management in high consequence areas. Integrity management is a regulatory method for assessing pipeline safety, determining risk and prioritizing natural gas transmission pipeline inspection, repair, and prevention and mitigation for pipelines that traverse high consequence areas (HCA). HCAs require higher protection because the impact of a failure would do substantial harm. The new regulations require natural gas pipeline operators to meet these mandates.

- Develop and implement a comprehensive integrity management program for pipeline segments where a failure would have the greatest impact on the public or property.
- Identify and characterize applicable threats to pipeline segments that could impact a high consequence area.
- Conduct a baseline assessment and periodic reassessments of these pipeline segments.
- Mitigate significant defects discovered from the assessment.
- Continuously monitor the effectiveness of its integrity program and modify the program as needed to improve its effectiveness.

Analysis—Many of these requirements are geographic data related. To comply with pipeline integrity regulations, operators need geographic and attribute data about the pipeline and geographic and attribute data for the surrounding region. Furthermore, operators need a way to perform a dynamic spatial analysis to determine HCAs. A wealth of third party applications are available that run as an extension to the GIS technology. They can address everything from probabilistic risk and HCA analysis to hydraulic modeling. By creating a GIS model for the pipeline system, operators can manage their pipeline assets, have the infrastructure to perform HCA analysis, and perform a host of other pipeline analysis.

Current GIS technology allows operators to manage, coordinate, and report discovered threats in a standard form to the Department of Transportation. By capturing and coordinating the data in a GIS, associating scanned documents (such as historic manual inspection reports), operators will be able to comply with the new regulations in a cost-effective way.

Geoprocessing With ModelBuilder

Geoprocessing involves deriving information through analysis of existing GIS data and is a critical function in all GIS software. Geoprocessing is used for many GIS activities such as proximity and overlay analysis, data conversion, and data summary. It can also be used to automate many batch procedures in GIS. Users apply geoprocessing functions to generate high-quality data, perform quality analysis and quality control checks on data, and undertake modeling and analysis.

ArcGIS Desktop provides a geoprocessing framework of tools that can be run in several different ways including through dialog boxes in ArcToolbox, as commands in a command line, as functions in scripts, and as inputs to models in ModelBuilder. This framework facilitates the creation, use, documentation, and sharing of geoprocessing models. ModelBuilder is a visual modeling language for building geoprocessing work flows and scripts.

ModelBuilder allows users to save models and rerun them using different input data. Users can also rerun their models using different function parameters, thus enabling them to calibrate their models or examine how they perform using different sets of values. Users can copy portions of their models within a model, and smaller models can be combined to build larger models.

ModelBuilder also allows users to share their models with others. This means that organizations can develop model templates for processing specific types of data and then distribute those templates to their users. New users can then add their own data to the model and run it using a consistent or prescribed modeling strategy.

ModelBuilder tools can be used to construct spatial models in any application area. For example, organizations can use ArcGIS Spatial Analyst ModelBuilder to create buffer zones around transmission lines, build a vegetation management model, show grid themes that prioritize restoration work, display vector themes for site suitability, construct a hazardous risk model, and so forth. The user can also build models in which all these spatial assessments are included in a single larger model.

ArcGIS 9 software includes ModelBuilder.

Vegetation Management Solution for High-Voltage Transmission Lines

New York Power Authority

On August 14, 2003, one of the worst blackout events in history descended upon the Midwest and northeast United States and Ontario, Canada. More than 50 million people were affected, and many lost power for up to two days or experienced rolling blackouts for up to a week before preblackout conditions were restored. Consequently, the United States and Canadian governments created a binational task force to investigate the causes of the blackout and to recommend system changes that would reduce the possibility of future outages. The task force determined that the loss of key transmission lines in Ohio due to contacts with trees was one of the primary causes of the blackout. A variety of other problems enlarged the crisis. The events triggered by the encroachment of trees within the wire security zones highlight the importance of vegetation management along electric transmission lines.

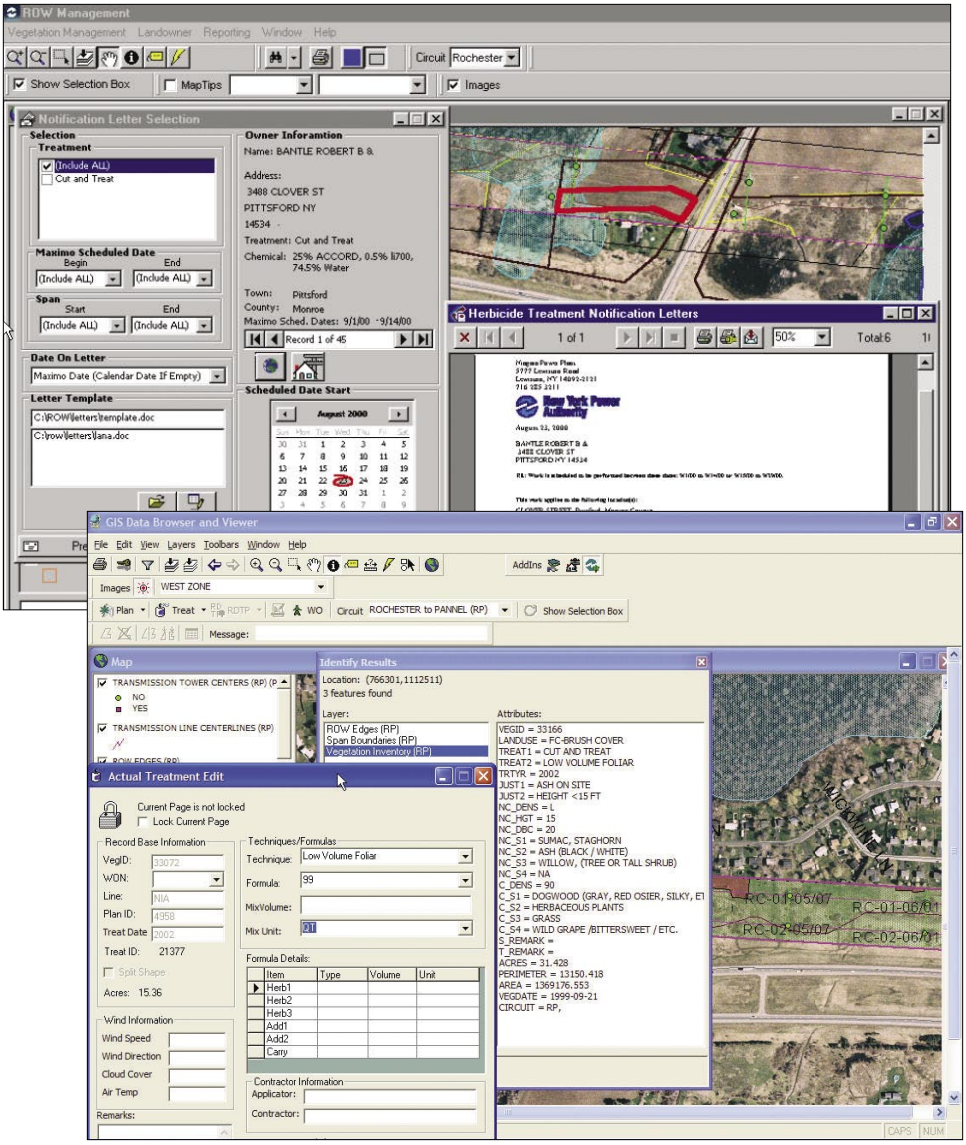
The New York Power Authority (NYPA) vegetation management program maintains approximately 16,000 acres of right of way (ROW). The program's principal goal is to provide safe and reliable transmission of electric power in an economic and environmentally compatible manner. Therefore, the authority has designed an Integrated Vegetation Management computer application (called the ROW Application) that uses GIS technology.

NYPA is the United States' largest state-owned power organization and one of the largest producers of electricity in New York State. The power is generated at 17 generating facilities and is distributed by approximately 1,400 circuit miles of high-voltage transmission lines. John Wingfield, GIS/Survey manager, explains that the enterprisewide GIS ROW Application "is linked to the land management, equipment maintenance, and environmental and engineering data, which is necessary to efficiently and effectively manage the authority's facilities and also to comply with all relevant regulations."

This technology has provided a focused and coordinated approach to fulfilling the goal of Integrated Vegetation Management (IVM), which has become a utility industry standard throughout the United States.

In an effort to enhance and modernize the implementation of its vegetation management program, NYPA partnered with the URS Corporation of Buffalo, New York, to develop and integrate new technologies that would improve its ROW management program. The previous ROW management process had relied on existing postconstruction plan–profile drawings as basemaps for delineating vegetation inventory data. NYPA's maintenance crews used these drawings to identify the location of treatment sites. Although this system worked, it had its drawbacks.

A major concern was that the drawings used for the inventory process did not reflect current conditions along a ROW. Additionally, there was no effective way to faithfully delineate the actual vegetation configuration within a ROW. This



Above Left: GIS provides access to geographic data so that IVM treatment techniques can be examined taking into account conditions such as wetlands, landowner's issues and agreements, site access, regulatory commitments, and security.

Left: GIS installed on rugged handheld field portable pen computers supports vegetation management in the field.

resulted in inaccurate estimates of brush acres or vegetation that actually needed maintenance. Employees manually recorded information about maintenance activities on paper.

The labor intensity of juggling these disparate data sources and the problems and costs associated with their deficiencies led NYPA to seek a better way to achieve its ROW management goals.

In 1999, NYPA aggressively promoted the use of geographic information system technology throughout the company in the areas of right-of-way vegetative management and real estate management. Because NYPA has been using GIS technology to support special projects since 1990, they had a realistic idea of the best method of achieving their goals.

The ROW Application development team includes NYPA's consultant, URS Corporation, surveyors, real estate managers, foresters, biologists, transmission maintenance managers, and GIS professionals from the authority. Wingfield believes that inclusive management leads to successful planning. "An effective program is not just a software application, it is using a bottom-up management style that gains an understanding of what people really need so you can fully leverage the system and the database. We had a series of meetings with virtually every member of the proposed user community and asked them to tell us what was needed. They were not bashful. In some cases, this caused us to change direction and get more out of the solution."

The team created an application that effectively organized a comprehensive data set so end users could easily use the data to support their work. Implementation of the program began by carefully determining all data elements that were necessary to support IVM. The development of the NYPA enterprise GIS ROW Application included two major steps—data collection and user applications.

The first step consisted of compiling existing electronic data. Some of the data was obtained from government sources and included streams, roads, regulated wetlands, and tax maps. The team created some data sets by digitizing data from paper records including real property parcel maps and transmission line plan–profiles. NYPA acquired high-quality digital orthophotos to serve as basemaps. Other data sets were created by recording the company's corporate memory through interviewing people who have worked for NYPA for years. These data included items such as access road locations and relationships with landowners. To create a consistent data set, all the coverages were normalized and adjusted to match visible features on the digital orthophotographic basemaps.

After NYPA converted existing records, it began collecting field data. A field portable GIS and mapping program facilitated field data collection. Using digital orthophotos as background maps, the field crews traced vegetation sites directly on the computer screen to produce polygons with true spatial coordinates. These vegetation polygons were attributed with information from pulldown menus.

The GIS database contained dozens of accurate, current data sets. URS developed an GIS IVM application based on ESRI's software. It provides easy access to data and a simple interface to perform relatively complex tasks such as creation of treatment plans that ensure compliance with all regulatory mandates and landowner agreements. NYPA maintains all vector and tabular data at its central data center, which gives all parties access to the most current information. Image data (digital orthophotos and document scans) are maintained on local servers at each NYPA site. This combination of centralized and distributed data storage provides the best possible response times across NYPA's widely separated wide area network. Central data access also ensures data security control.

The ROW application helps ROW managers evaluate current vegetation conditions. It provides access to geographic data sets, so vegetation management treatment techniques can be examined in a way that includes factors such as wetlands, landowner's issues and agreements, site access, regulatory commitments, security, and dangerous tree trimming sites. The application also has a function that serves the treatment plan review process and another function that creates work orders through MAXIMO.

The IVM program incorporates a balance of cultural, physical, biological, and chemical tactics

GIS helps a real estate professional with notifying landowners of the herbicide application.

to control the targeted tall growing tree species. It also works to enhance the abundance of all lower growing desirable vegetation. A regular inventory and documentation of maintenance activities allow for analysis, evaluation, and continuous improvement in the overall ROW management program.

The IVM work flow from scheduling treatments to evaluating effectiveness is a smooth process. Field inventories are annually conducted for the ROW scheduled for treatment the following year. NYPA's system forestry staff reviews the inventories and treatment recommendations, accepting or modifying the recommendations as they deem necessary.

Once the actual fieldwork begins, the treatment plan and related data are downloaded to field computers for use by NYPA inspectors. These inspectors track the actual treatment in the field and then upload the data to the central server for future use. This data supports contract change orders, regulatory reporting, information for seeking bids, and other reporting needs. After the next field inventory of the same ROW is completed, NYPA uses the as-treated data to analyze how well the previous treatment cycle worked.

Says Wingfield, "On the first line where we had a repeated cycle we saw a 60 percent noncompatible vegetation reduction. Presumably,

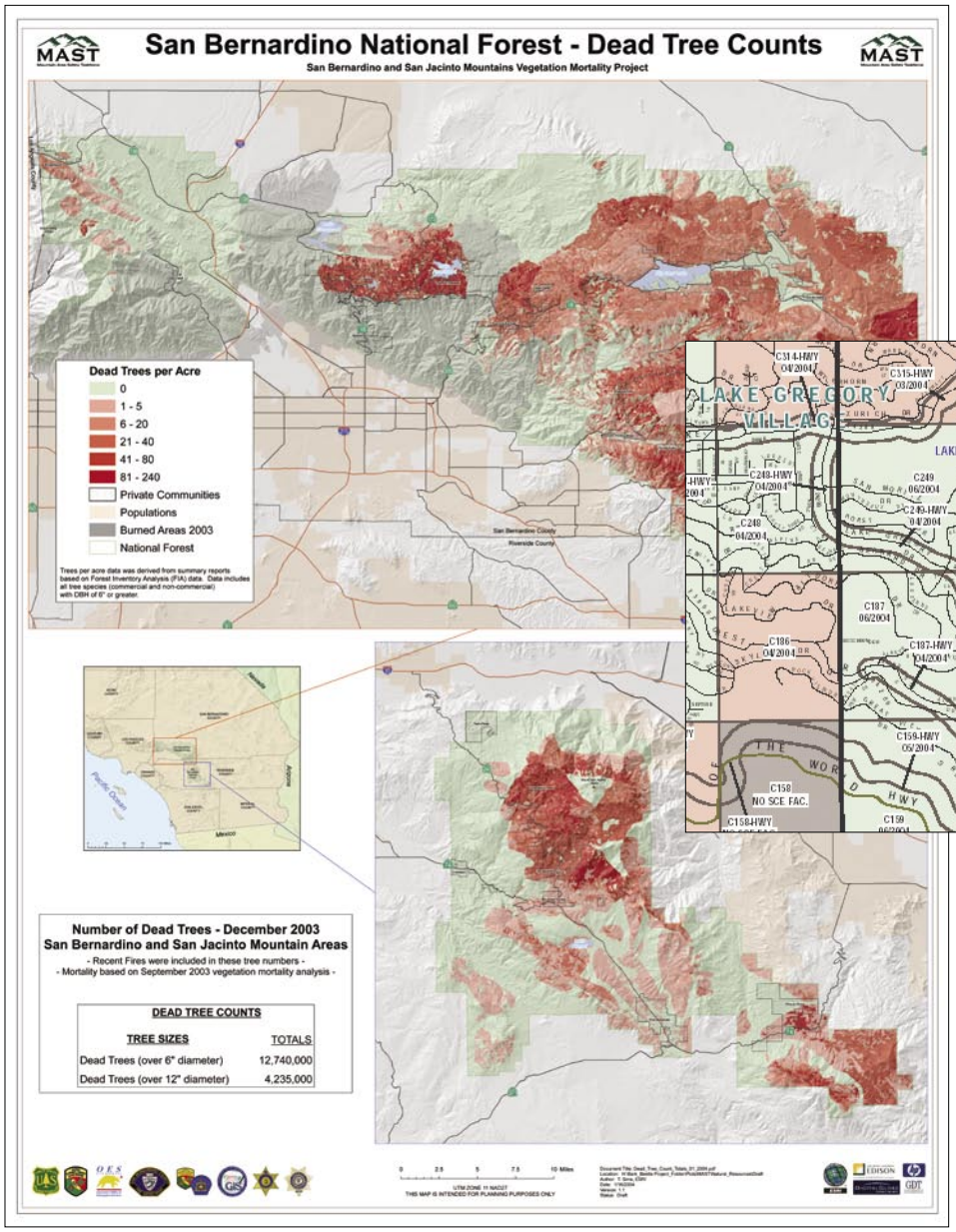
Continued on page 17

Beetles Destroy Forest
SCE Maps Vegetation Mortality

The San Bernardino National Forest is experiencing significant drought-related, vegetation mortality. Forests in the mountainous regions of San Bernardino, Riverside, and San Diego Counties of California are dead or dying due to widespread infestation by bark beetle.

More than 100 years of fire suppression has resulted in overly dense stands of trees. This, followed by a five-year drought, has resulted in too many trees competing for too little moisture. As a result, the trees are highly susceptible to bark beetle attack. These beetles are now at epidemic proportions.

Approximately 400,000 acres of trees in the San Bernardino and San Jacinto Mountains on both private and public lands are dead or dying. The California Department of Forestry and Fire Protection (CDF) estimates that 900,000 trees have already died. The number of dead trees will continue as the bark beetle infestation spreads. About 100,000 people live within these mountains. If a large fire occurs, it is likely to threaten the lives of many residents and forest visitors. According to the San Bernardino and Riverside County Tax Assessors, residential and commercial properties in the National Forest area mountain communities have a combined assessed value of more than $8 billion.



This map represents dying trees in the San Bernardino National Forest, an important factor of the rapid spread of recent fires. The percentage of dead trees in the area (represented by darker reds) is greater than living trees (greens).

On March 7, 2003, a California executive order proclaimed a state of emergency in San Bernardino, Riverside, and San Diego Counties in response to the bark beetle infestation. On April 3, 2003, the California Public Utilities Commission (CPUC) directed Southern California Edison (SCE) and other utilities in the affected counties to take all reasonable and necessary actions to remove trees threatening power lines.

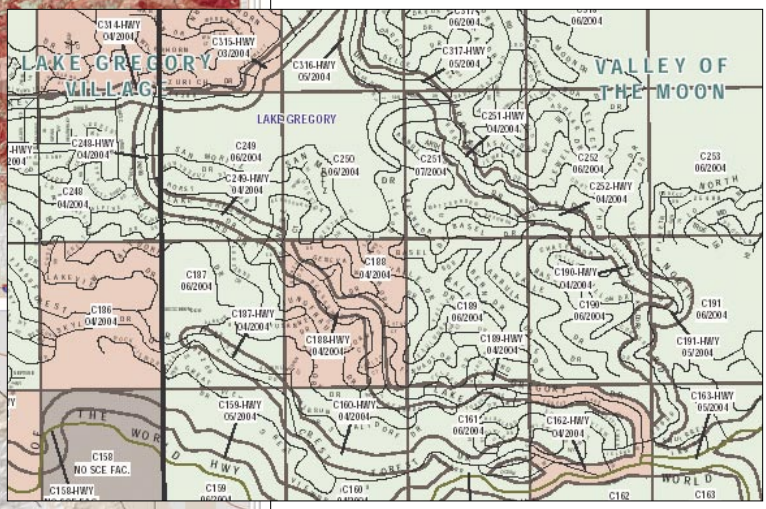


Figure 2. This map shows the Southern California Edison tree cutting schedule for the Lake Arrowhead area in California.

In response to the state proclamation and CPUC's directive, SCE is working in conjunction with the CDF, and county, state, and federal officials to remove hundreds of thousands of trees in the affected regions.

ESRI, in collaboration with resource management experts and SCE, helps provide a priority model to determine treatment areas

and prioritize them based on variables such as vegetation mortality, population, roads, utilities, and other values.

A careful watch is being kept on the forest's high fire risk areas by these agencies and many others. The Mountain Area Safety Taskforce (MAST) is central to coordinating this effort. It sponsors a public service information program. Its Web site, supported by ArcIMS, delivers interactive map updates about fires, vegetation mortality, and other valuable public safety information (Figure 1).

"We perform analysis to fully understand the extent of the dead and dying trees and all the drought-related problems existing in our local forests," says Gerco Hoogeweg, MAST project manager for the lab. "We also want to get an accurate understanding of the progression of the problem that is taking place. This was used for the recent wildfires, and we will continue to refine the database to respond to possible future events."

SCE, along with federal, state, and local agencies, is part of a large-scale effort to remove the infested trees, which will take five years or more to complete. SCE is cataloging dead or dying trees near its power lines. At the same time, it is removing trees, beginning with those that are in the greatest danger of downing electrical lines. SCE's tree removal schedule for residents, businesses, and property owners in the affected areas is posted on MAST's Web site (Figure 2).

As work in specific areas is scheduled, electric power to nearby homes may need to be temporarily cut off—in extreme cases for up to 24 hours. SCE notifies residents of scheduled tree removal and outages before work begins so they can prepare appropriately for after-dark lighting and perishable food storage needs. The MAST Web site linked to the SCE Web site is an important up-to-date resource for the community to see the state of the forest.

Vegetation Management Solutions Position Utilities for Regulatory Compliance

Keeping trees trimmed around power lines is important for maintaining power system reliability and ensuring public safety. The importance of vegetation management was emphasized in the August 2003 blackout findings resulting in proposed ruling of the Federal Power Act, Section 311, that requires power companies to submit vegetation management reports. GIS has made it easier for utility companies to maintain power line corridors and to comply with federal regulations.

Because power system assets and locations are being inventoried in a geodatabase, it is logical to extend this database to include related vegetation management data. GIS is an ideal platform for the management of tree locations, growth patterns, and maintenance activities. GIS allows for the visual and analytical integration of data from a variety of sources such as asset location, right-of-way areas, and access roads. Additional data can be added to reflect specific utility concerns or areas of sensitivity such as landowners and endangered plant and animal species. The addition of street data can support routing of inspectors or tree trimming crews.

Linking field-based GIS tools capturing tree trimming operations with other corporate systems, such as work order processing or outage management information, provides a new view of the results of vegetation management programs. The more information at the fingertips of vegetation program managers, inspectors, and field crews, the faster decisions can be made and the more efficient operations will run. GIS helps to facilitate all these efforts.

The Kenerson Group (TKG) is an ESRI business partner specializing in vegetation management for urban foresters, utility foresters, arborists, and municipals. They have found that many utilities maintain vegetation management data on Excel spreadsheets. TKG developed an ArcMap extension allowing users to view, analyze, and update the Excel data via the intuitive map-based interface with GIS.

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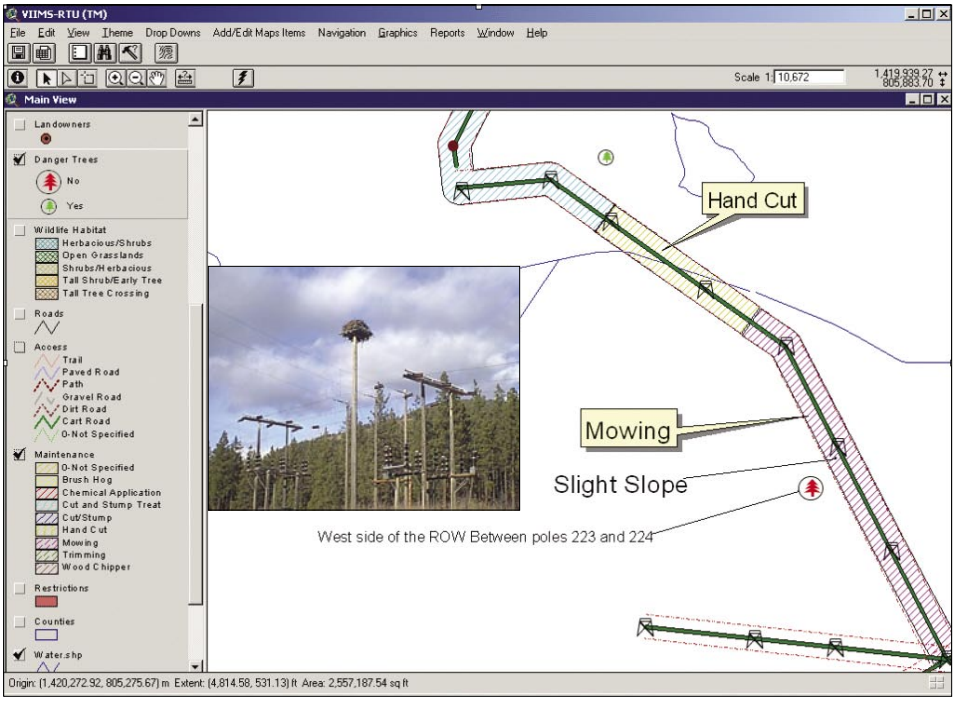
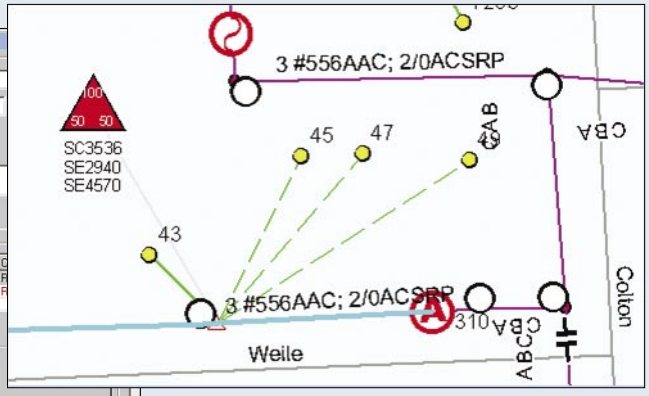


Maintenance areas around transmission lines are color coded for vegetation management treatment.

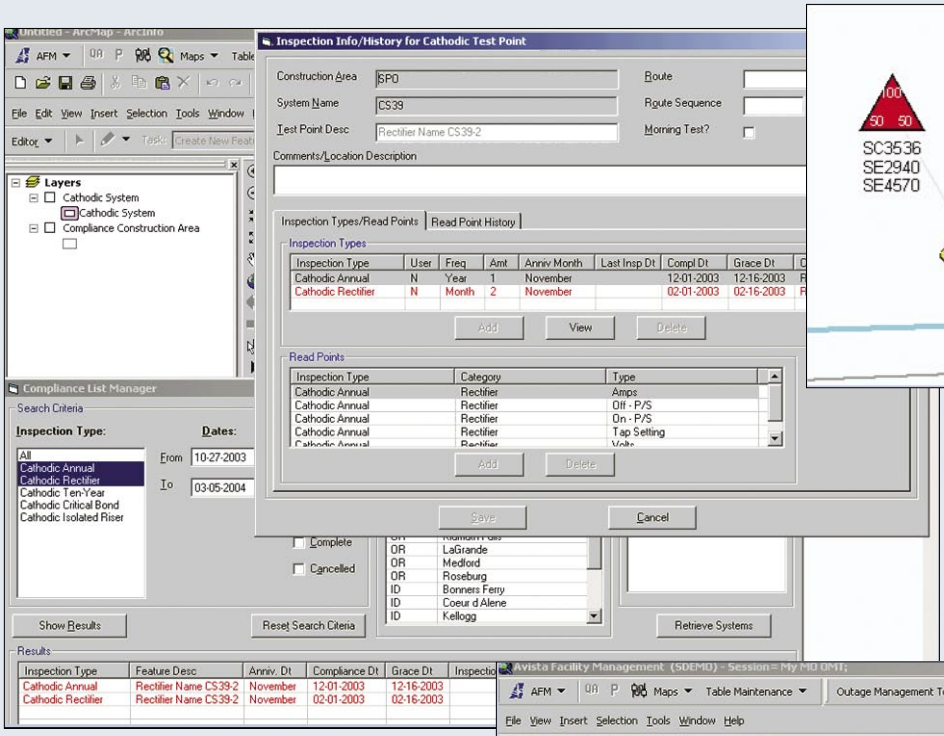
Utility Networks for Avista

Avista Corporation is an energy company involved in the production, transmission, and distribution of energy as well as other energy-related businesses. It provides energy to 320,000 electric and 290,000 natural gas customers primarily in the Pacific Northwest.

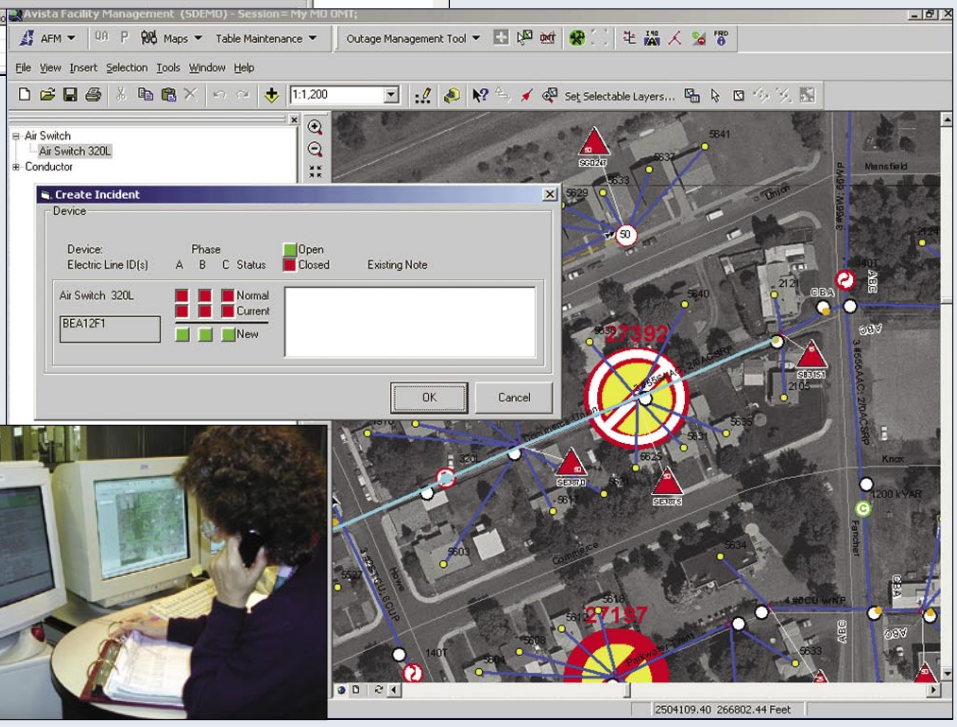
Avista has a long history of using GIS for meeting its facility management needs. In 1978, it developed its own in-house automated mapping system using ray tracing scopes. The power company's long-standing relationship with ESRI began in 1991, and within a few years it was building its own GIS applications and tools based on Miner & Miner products. Today GIS models and tools are used throughout the company.



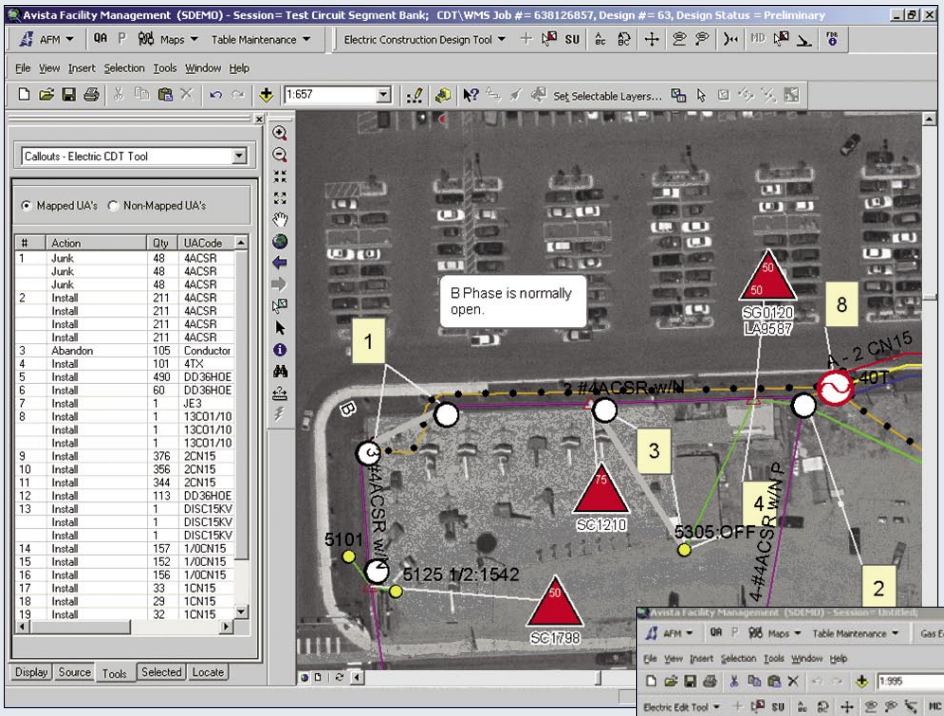
Both the electric and gas models take full advantage of ESRI's ArcGIS 8 utility network. By implementing a network model, a wide variety of connectivity and tracing analysis options become available.



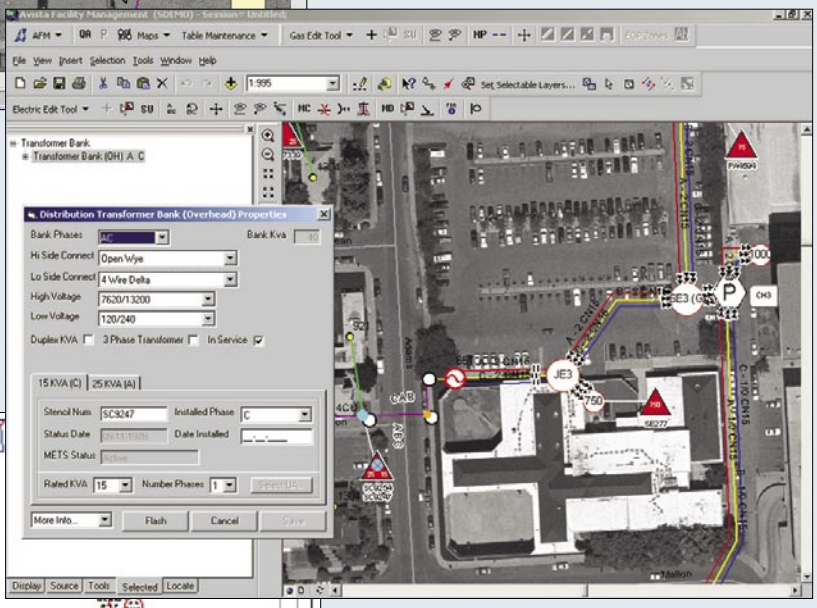
The GIS-based Gas Compliance application will help ensure that Avista meets Department of Transportation and state commission requirements. The application integrates various systems and processes into one system. The application tracks valve maintenance, bridge crossings, and cathodic inspection types.



Avista's Outage Management Tool uses GIS technology to help dispatchers and crews assess the cause of power outages, group together customers who are affected by the same failed device, track crew activity and location, and manage multiple power outages more efficiently. The tool is built on ArcGIS 8 technology.



The Construction Design Tool will give both gas and electric construction design representatives the ability to use GIS for designing construction jobs.



The Edit Tool allows for maintaining and updating the data as it is delivered from the field inventories and as-built work. It makes certain that the data is maintained correctly to match the established models.

At Avista, one of the foremost goals of Avista Facilities Management (AFM) is to reduce the need for hard-copy maps because the facility data is already available at the user's desktop. Printed maps, however, will continue to be needed for certain functions, and GIS has the ability to produce high-quality feeder, dip, operations, and meter route maps.

Special thanks to Curt Kirkeby, Avista's lead technical services engineer, for providing these maps. To read more about the Avista GIS story, visit www.esri.com/industries/electric.

Power Company Develops and Sustains Quality Data Idaho Power

Efficient utility work processes often require the automated exchange of data between business systems. Getting systems to work with each other is often a data sharing challenge. Importing and exporting data between systems may require middleware that accommodates the application of business rules required to ensure data integrity between systems. Idaho Power needed to bring together its ArcGIS asset record system with its CES Centricity outage management system. It is important to Idaho Power that these systems interact smoothly for users to perform the tasks of building and operating the power company' s electric distribution network.

Idaho Power is involved in the generation, purchase, transmission, distribution, and sale of electric energy in a 20,000 square mile area in southern Idaho and eastern Oregon. Idaho Power supplies electricity to approximately 427,000 customers. It owns and operates 17-hydorelectric power plants and shares ownership in three coal-fired generating plants.

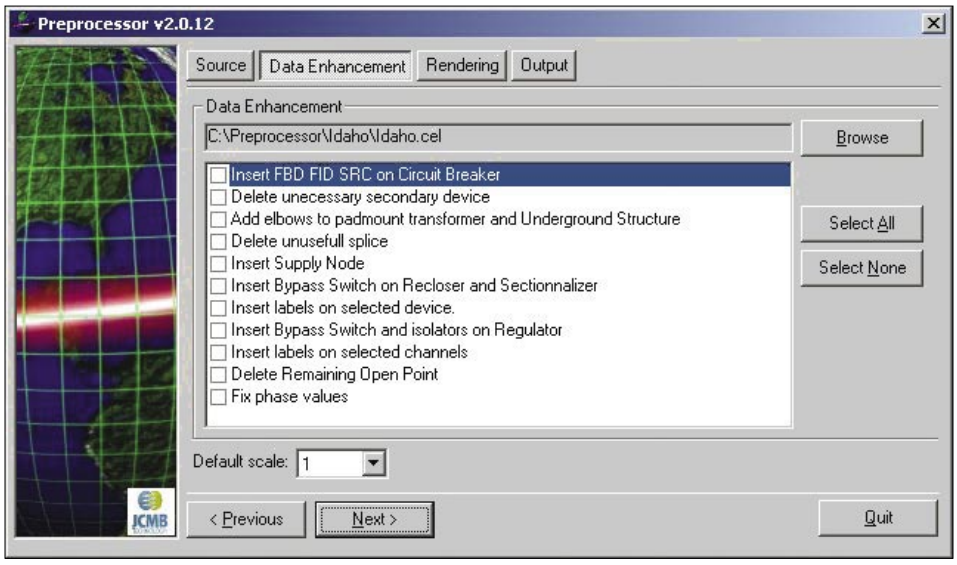
At the foundation of successful information sharing between business systems is quality data. The more timely and accurate the data, the better the information value and resulting decisions.

A common problem for utility companies is establishing and maintaining the high volume and extensive detail of their network asset data. Like many utilities, Idaho Power, is working on an iterative process to improve its data quality. For example, as-built facilities data stored in the GIS did not contain all the data necessary for effective operations of their OMS. Full network connectivity is particularly critical for the OMS system to operate and all the components were not available.

Before edit

After edit

To solve this problem Idaho Power contracted with JCMB Technology, a utilities focused data intelligence company. The company offers software and services that provide high quality, high fidelity data. Idaho Power gave JCMB the task of improving data integrity and connectivity so that quality information could be exchanged between systems. JCMB performed an analysis, identifying all the necessary business rules for the information exchange between the GIS and OMS system.



This caption combines both of the following images: Business rules are applied for a recloser, adding different switches. Each added device is electrically connected.

Using network analysis or quality assurance tools is a common practice among power companies to assist in improving the quality of their asset data. Based on the business rules JCMB defined for Idaho Power, JCMB developed a set of tools to support this process.

The tools provide the ability to run a network trace, produce reports or visual displays of discrepancies, and a means to correct or insert missing information. For example, the data may be missing elbows or switching devices that should be placed on each side of a padmount transformer—essential information needed for properly operating an OMS. Once technicians are able to verify that the electric network data is accurate the data can be passed on for operation in the OMS. Idaho Power has strengthened its work processes and improved data accuracy, which increases confidence in and usability of data shared between systems.

Ensuring data integrity does not end when the existing data is accurate. Processes are needed for sustaining data quality as new construction is completed and added to the network. Idaho Power again used the expertise from JCMB to establish tools for this workflow. The tools provide the extraction of areas of interest from GIS into the engineering design environment. After the new work information is completed it flows back into GIS using the aforementioned quality assurance work processes. Data quality is maintained and information is shared between business systems, completing the cycle.

Learn more about JCMB at www.jcmb.com.

Streamline Inspection Effort Southern Company

Transmission companies must perform transmission and inspection of lines to keep the power flowing, but these inspection programs can vary greatly. Some programs are tedious requiring paper forms, pen and ink, clipboards and accordion files. Other designs are technologically smart and use digitized PC tablets that are uploaded to a central database. These portable electronic inspection systems facilitate GPS, digital images, routing, inventory, and even work order inventories. The two most important aspects of any transmission inspection system are the quality of the data and the usefulness of the data.

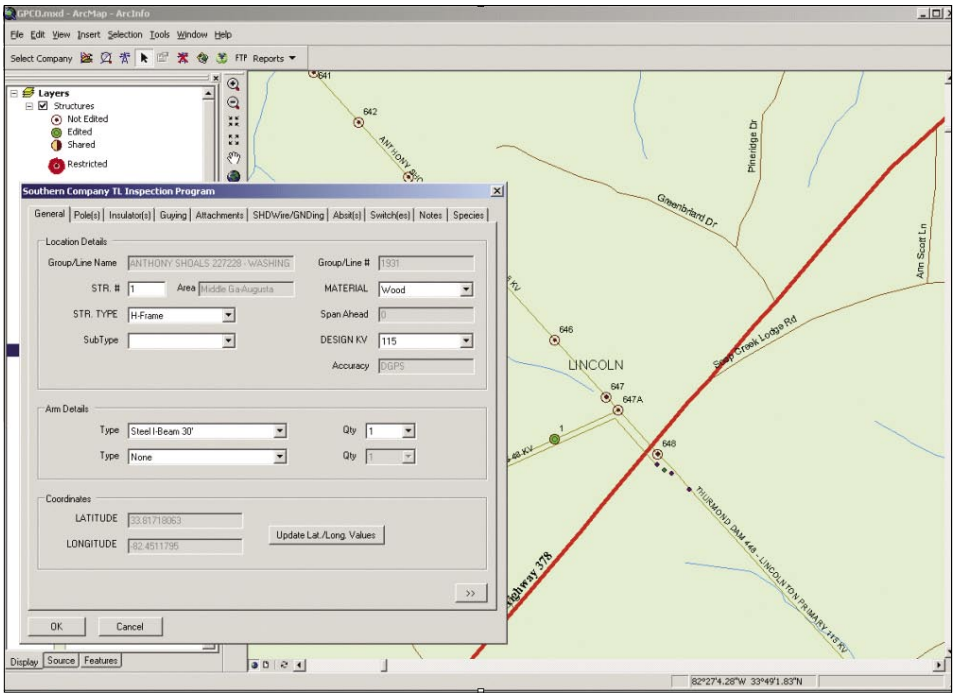
Southern Company is one of the largest utility companies in the United States. Southern Company has more than four million customers and is a leading generator of electricity. It consists of five electric companies—Alabama Power, Georgia Power, Gulf Power, Mississippi Power, and Savannah Electric.

Southern Company's five individual operating companies have transmission line inspection crews that are independent of one another, and each operating company has different inspection requirements. Although the operating companies used the same inspection contractor, corporate use of the contractor was not centrally planned creating personnel coverage gaps for the contractor, which resulted in inspector turnover and increased time spent on training.

Southern Company's Transmission Maintenance Committee tackled the inspection project from several directions. It held discussions with the inspection contractor to determine the feasibility of reconfiguring the company' s contractual arrangements. As part of the effort, the maintenance committee did a thorough analysis of what types of data needed to be collected. The maintenance committee identified four types of operations that would ultimately be incorporated into a Transmission Line Inspection System (TLIS): ground line treatment, aerial patrol, climbing, work orders, and general navigation. The first phase of the project addressed ground line treatment requirements.

The project committee selected ESRI' s ArcPad as the foundation application for the first phase of the TLIS. Each operating company used ESRI technology to maintain its respective landbase data as a backdrop in ArcPad for the inspections.

Working together with Southern Company' s Information Technology (IT) group, the project committee assembled a high-level plan that detailed the proposed interactions between the compact terrain database (CTDB) and the TLIS. The IT group was tasked with implementing the interfaces between the CTDB and the TLIS applications. In addition, the committee contracted MESA Solutions to develop the custom extensions to ArcPAD for capturing field inspection data.



For the first phase of the TLIS project, the project committee used IT' s resources to complete the system design for the requirements of the application. A common set of data files was defined to facilitate the transfer of structure information between TLIS and the CTDB. Once these files were defined, IT was able to start creating the Transmission Line Management System, its gateway application to access the CTDB. MESA initiated development of the TLIS. The Southern Company Transmission Maintenance Committee facilitated discussion and coordination between the two separate development efforts.

The TLIS allows inspection contractors to quickly gather information in the field using ruggedized computers. Once a set of inspection data is collected in the field, the contractor is able to package the data (using a special MESA developed Work Complete function) and transfer the data to the appropriate Southern Company resource. By using the IT developed transmission line management system (TLMS) application, the Southern Company resource is able to integrate the collected data into the CTDB.

After the original TLIS application had been successfully operated for a year, the Transmission Maintenance Committee initiated the second phase of the project. The objectives of phase two included incorporating the tools for performing climbing, aerial, and navigation inspections. Each of these inspection types captured different sets of inspection information and this needed to be reflected in the new TLIS application. Additional functionality was added to allow for the GPS capture of access road locations and the ability to display documentation associated to the current inspection work order.

Based on the results of several design workshops, both IT and MESA began work on the modifications to the TLMS and TLIS applications. IT modified the application to accept inputs from both the ArcView and ArcPAD TLIS applications. MESA retooled the TLIS to execute in the ArcView environment.

At the end of the second phase, inspection contractors and Southern Company personnel were able to more effectively and efficiently perform their inspections in the field and use this information to make the main set of equipment information more complete and reliable.

For more information about MESA Solutions, visit www.mesasolutions.com.

Utility Enhances Economic Development Market

PPL Electric Utilities

Four years ago, PPL Electric Utilities worked with GIS Planning to integrate GIS technology into its economic development searchable property locator. This allows the user to view a photo of a property and a floor plan based on the user's specific criteria. GIS technology then presents a real-time, zoomable map showing where the property is located in relationship to major highway networks and other infrastructure. Demographic data can be pulled surrounding the site in user-defined radii of the site.

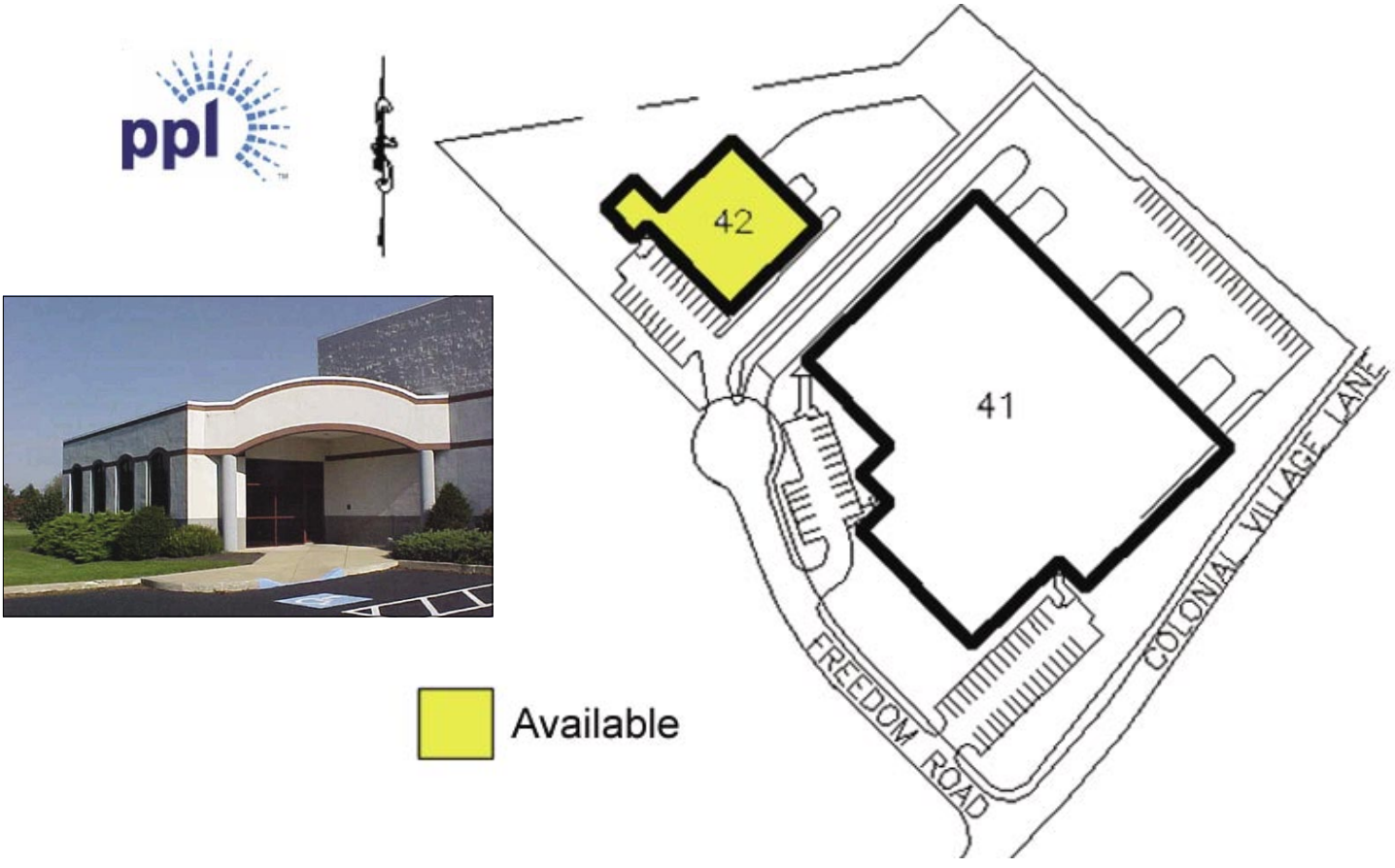
Instead of having to visit every potential site when planning an expansion or relocation, site selectors, Realtors, and company executives can sit at their desks while they narrow down the field. Based on specified criteria, users can select the best five to seven sites from a wide selection of possible alternatives. Users are able to compare all the sites within PPL's 45-county Pennsylvania gas and electric service areas with same source statistics and make accurate comparisons based on valid data.

This helps PPL employees better use their time. Fewer resources are needed for site selectors, Realtors, and company executives as well as for economic development professionals to make smarter decisions.

Demographic data selection guidelines are from the National Database Standards adopted by International Economic Development Council. These standards, which were developed after months of meetings between economic development professionals and national site selection experts, provide economic development professionals with a road map of the information most often requested and used by company decision makers.

Finding the data and keeping it current was the next challenge. PPL Electric Utilities solved this problem by purchasing the data from the Pennsylvania State Data Center (PSDC), a national depository of census data. The PSDC worked with state government agencies, such as Department of Labor and Industry, the Rural Development Association, the Department of Education, and others, to provide the data it does not regularly collect.

Now PPL has a tool to offer its economic development partners. Through the technical expertise of its information systems department, PPL has been able to provide local and regional economic development organizations in its service area with the option of using this sophisticated available property database as their own. The portal entry from their site to the PPL site is seamless. Web site visitors can view only properties from the PPL database in their county or service area. This partnership puts geographic data, which may otherwise be unaffordable to small economic development groups, in the hands of many people who in turn use their knowledge of the local property market to keep the data up-to-date.



PPL Economic Development Web page shows available site footprint.

Reliance Energy Limited Implements ArcGIS and ArcFM

New Delhi, India

Following extensive competitive technical evaluations, Reliance Energy Limited (REL) has chosen ESRI and ESRI Business Partner Miner & Miner to provide its GIS platform and will use ESRI's ArcGIS desktop clients (ArcEditor and ArcView), ArcGIS Schematics, ArcSDE, and ArcIMS. REL is also implementing the ArcFM Solution product suite consisting of ArcFM Viewer, ArcFM Editor, ArcFM Designer, Conduit Manager, and Responder from Miner & Miner for its outage management system.

ESRI's ArcIMS Internet technology will play a pivotal role at REL in disseminating information stored in the utility's geographic database.

REL is India's leading integrated power utility company in the private sector, serving 25 million customers over 124,300 square kilometers. Along with its affiliates it has a significant presence in generation, transmission, and distribution providing more than 16 billion units of power a year to Maharashtra, Delhi, Orissa, Goa, Andhra Pradesh, and Kerala.

The company has a pioneering history of leadership and innovation spanning 75 years in Mumbai providing dependable electricity at competitive prices to its consumers. The company has 941 MW of power generation capacity at plants located in Maharashtra, Andhra Pradesh, Kerala, Karnataka, and Goa.

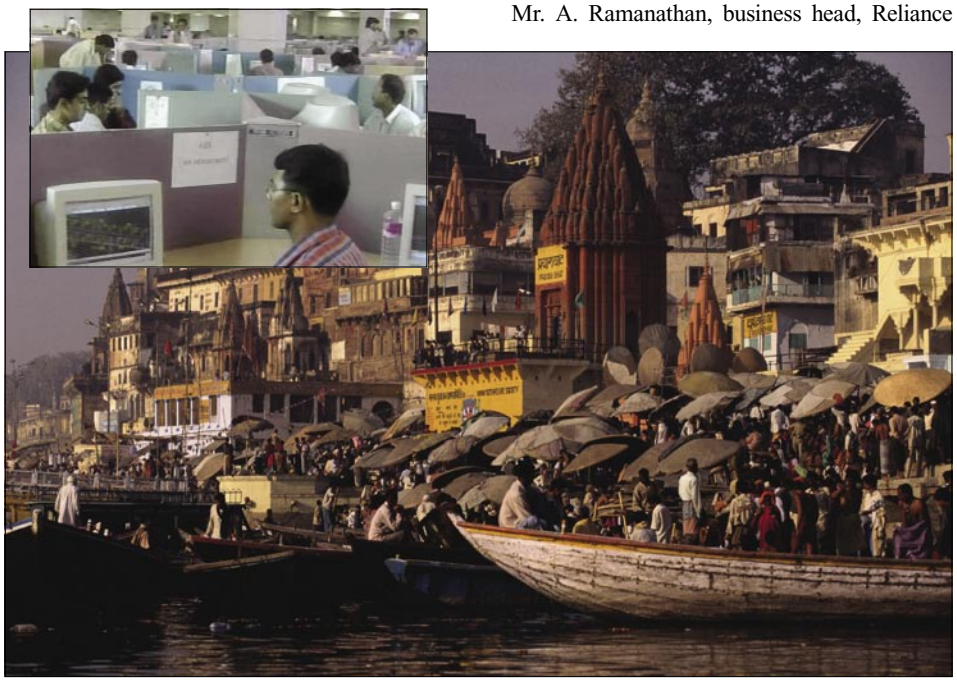
REL conducted an extensive benchmark prior to selecting ESRI and Miner & Miner. The company is implementing sophisticated
applications and upgrading its operations through the use of GIS to leverage spatial information and technology across REL. After conducting a comprehensive evaluation of GIS software, it decided to implement a GIS based on the robust set of software and open information technology (IT) standards capable of integration with other enterprise systems.

A fundamental component of the system at REL is spatial information. Whether it is customer-, asset-, environment-, or competitor-related data, geography will become the integration framework for all of its databases. Various business units at REL will drive the GIS requirements. For example, the asset management departments will utilize the GIS infrastructure and data to support various spatial business needs, including design, network analysis, and outage management. REL expects ArcGIS to greatly expedite both the implementation of enterprisewide projects and the integration with SAP, CIS, SCADA, and other IT systems.

Mr. A. Ramanathan, business head, Reliance Digital World (P) Ltd., a newly formed company of the Reliance Group for implementing GIS and GIS-based solutions for the Reliance Group of companies and other clients, comments on the future of GIS in the electrical utility industry. "A well-planned GIS in the utility industry helps integrate diverse IT systems, such as SCADA, CIS and IVR, SAP, and Outage Management, resulting in an efficient distribution to successfully deliver quality service at an affordable price and improve customer satisfaction."

NIIT-GIS Ltd. (ESRI India) will be working with REL to ensure that the company is able to successfully leverage its geographic data and GIS knowledge across the organization. ESRI India will play an important role by providing local support in the form of training and implementation services for REL.

For more information, contact Dave Byers by e-mail at dbyers@esri.com.



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Vegetation Management Solution for High-Voltage Transmission Lines

on the next cycle we will see another significant reduction. Eventually, because of our IVM program, we will be using only a tiny fraction of the herbicides and manual effort we had used in the first cycle. We have already saved a significant amount of money in the first cycle; ultimately, we will have saved money and had an ecologically positive result."

In the aftermath of the 2003 blackout, the federal energy regulatory commission and other regulatory bodies requested information for follow-up investigations. NYPA's delivery of comprehensive information was impressive. Federal organizations such as the Environmental Protection Agency requested demonstration of NYPA's management solutions. Wingfield reports that these officials rated the IVM solution as the most successful they had seen.

To learn more about New York Power Authority's GIS ROW Application, contact John Wingfield at John.Wingfield@nypa.gov.

GIS for Starters

City of Leesburg, Florida

The advantage of the local municipal utility is that it is tailored to local needs. The Department of Energy annually reports that municipal electric systems have significantly lower management and operating costs than private companies. The city of Leesburg, Florida, uses GIS in many of its departments to keep costs low and service quality high. The city's municipal services are launching GIS applications, currently in pilot stages, which are tailored to each service's needs.

Its electric utility serves approximately 17,000 residential customers and 3,350 commercial customers. It has 236.6 total miles of overhead primary lines, 150 total miles of underground primary lines, and 6,690 transformers. The natural gas utility serves approximately 9,500 residential customers and 600 commercial customers, both inside and outside the city limits.

Network gas lines layered on aerial photograph

Leesburg's different municipal services were on multiple software platforms, and the maps were in a variety of formats. The storm water department was using paper maps, and the water, gas, electric, and telecommunications departments were all using computer-aided drafting (CAD) formats. John Meier, the city of Leesburg's GIS manager, explains, "The city wanted to bring all its utilities into the same database so that people could look at one map and see multiple utilities. A developer would come into the office and request a map of utilities for a specific area. The city office staff pulled four or five different maps, made photocopies of them, and then explained the maps to the developer by showing where the water lines, electric lines, and sewers were located. We knew that GIS would make everyone's lives easier. By displaying all the utilities on the same map, staff will be able to easily create maps for developers that show the location of utilities in relationship to the property of interest."

For its new GIS, Leesburg chose to use ESRI products because of the software company's solid reputation. It then added Miner & Miner's ArcFM to its ArcGIS platform for providing facilities management solutions.

In the planning phase of the project, the city performed its needs assessment after signing the ESRI software agreement. This is not the normal progression, but the city was working with budgetary constraints and needed to use leftover funding. ESRI is helping with the needs assessment and will send a final document with a suggested plan for software, hardware, services, and so forth. The needs assessment shows that GIS will have a wider user base than originally imagined. Meier says, "We are going to have more than just the GIS team using the system. Initially, we thought that the city's eight-member GIS division would be the principal users. After the needs assessment, it became clear that other departments wanted to use it, so we are going to push it out there for engineers in the electric and gas departments to use for network design. The water and storm water divisions, however, feel that they do not want to do designing and prefer that the GIS division do it for them. So our division may end up maintaining more than the data itself. It is still not settled."

Miner & Miner partnered with ESRI on developing a data model for the city. It is tailored to specifications of all seven utilities. For example, domain changes were made to show the type of materials that workers use. Also, preferences in terminology have been adjusted.

At this point of the conversion, project data is being readied. Pilots for water and storm water have been launched. Next on the agenda is gas. A quarter square mile of gas data has been converted so that users can verify the data format. The next step is to do tracing.

The utility group wants a strong tracing function because it has relied heavily on this function in its CAD environment. Therefore, designing a tracing application has priority. It will be for tracing electricity, which is also the most complex utility network. Staff is designing the application in-house using Miner & Miner's Designer software. Designer provides an integrated environment for preparing construction work sketches, work flow, management, structural and network analysis, automated layouts, and job cost estimates. It provides an automated means to update the baseline corporate GIS database, based on changes to the electrical, gas, and water distribution facilities shown on a work sketch. Meier says, "This will help engineers create different versions for planning, extending lines, and so forth."

The city of Leesburg contracted out the facility's inventory with Southern Reprographics, Inc., who is recording facility data using GPS. Meier says, "This helps us see results right away because we can lay data over our aerial photography and see how well it matches. It has been useful for making adjustments."

An effective planning process for starting a GIS project is to

- Clarify the information products that need to be produced by the system.
- Establish what data is needed to create the information products.
- Identify system functions that will be used to create the information products.
- Assess the benefits to the organization of having the information product.

Nothing beats strong planning for creating a successful outcome. For more information about ArcFM, visit the Miner & Miner Web site at www.miner.com.

Meeker Cooperative Extends Its GIS

More than just a brainy engineering tool, GIS has many applications for cooperatives. With its geodatabase in place, Meeker Cooperative is using GIS for facilities management, outage response, staking, field service, vehicle location, and even marketing. A member of Great River Energy, Meeker Cooperative serves electricity to 8,000 residents in six central Minnesota counties. Meeker Cooperative cares about its community and seeks to deliver high-quality service on all levels. This is a driver for applying GIS in multiple venues.

Meeker Cooperative migrated from CAD to ArcGIS software in 2000. Kevin Louis, Meeker's operations and IT manager, describes the need for change, "We wanted more flexibility with data tied to our maps. There is so much utility data that needs to be managed, especially in the operation file—from cabinet inspection to pole inspection. Pole data, outage information, regulator, special equipment, and so forth, are all part of the database. I wanted to tie this data to maps. GIS allows us to tap on a map and pull up the database. GIS is the main hub to a wheel and all the information spoke out from it."

New applications are always on the Meeker Cooperative GIS workbench. The co-op recently upgraded to ArcGIS 9. Currently, it is working on a GPS project that captures pole inventory and ties this information to pole testing. It combines cabinet underground inspection data, the regulator database, and customer data. Customer data, such as addresses, phone numbers, and so forth, are useful data for the automated meter reading (AMR) system. Demand information is relayed to field personnel so they know if transformers are overloaded or underloaded. GIS uses regulator information to show panel types, regulator types, and reclosure information. The co-op's Turtle AMR provides a blink count that indicates the number of times a member has a blink in power. This is tied back to GIS so trends can be mapped. Problematic line segments that have more than two to five blinks in a given period of time are color highlighted.

The outage management system is tied to the Cooperative Response Center, or call center. Outage data is entered either through the automated voice system or by manual entry. GIS indicates outages with different colors according to the dispatch level—no power and not dispatched is red; no power and dispatched is blue; restored power from an outage is green. Personnel click on a blue section, for example, and see which truck has been dispatched to that site (Figure 2).

Blinks in power are shown on maps to see problem trends in line segments.

Meeker is piloting an application that extends GIS to the new automated vehicle location (AVL) system. Louis explains, "We are interfacing our AVL system for vehicle locating. We will be able to see dynamically on our GIS maps where vehicles are. Field workers cover six counties and maintain approximately 1,900 miles of line. Our crews like being monitored because they are out there by themselves. Now we can see where they are. A GPS unit and a small radio are mounted in a truck. A radio signal is transmitted at a standard 400 MHz frequency back to the office where it is captured with a monitoring program. It is simple and fairly inexpensive."

Mobile GIS is being used by field crews. All the co-op's trucks have computers that use ArcReader for mobile mapping needs. Louis says, "We are extremely happy with it. Field-workers have ArcReader and a geodatabase on

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Cooperative Creates Public Relations Ties With Web Application

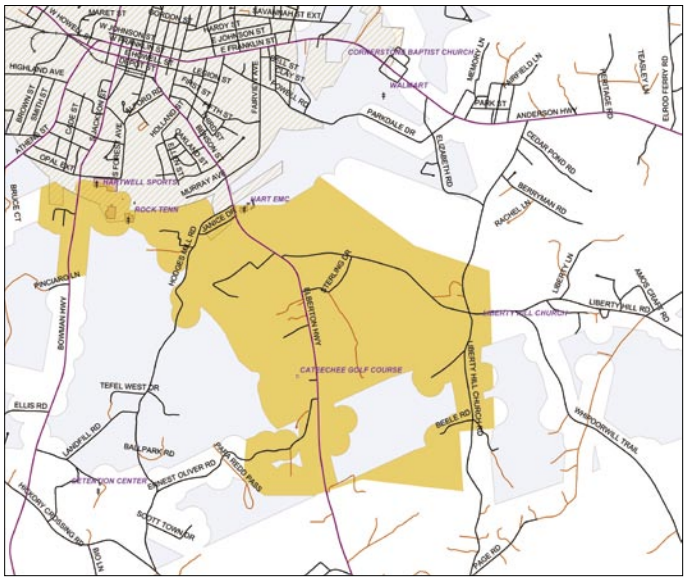
Hart Electric Membership Corporation

A cooperative is owned by the people it serves and its mission is to serve the community. In rural areas, community service is often extended beyond providing power. The power cooperative may be the source of local mapping and a resource for important community information, especially in emergency situations.

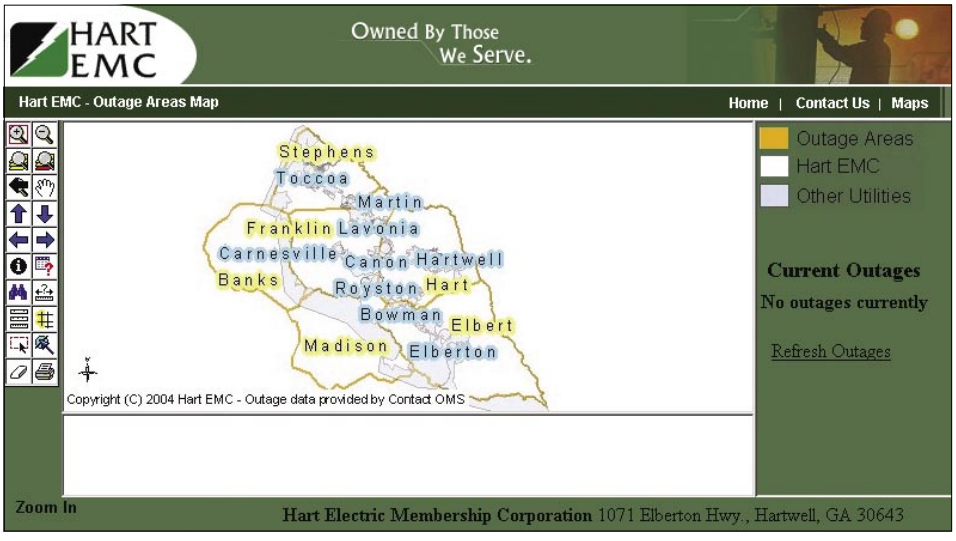
Hart Electric Membership Corporation (EMC) uses GIS to serve the community in many ways. A public relations Web site (www.hartemc.com) offers information on outages, the weather, economic development, and much more. The ArcIMS supported Web site is accessed by media who relay information about outages and storm damage to the public. In addition, the co-op is a map center for the region. Web site visitors can access general land base maps with layers for roads, railroads, lakes, rivers, and so forth. Fire information is posted for the volunteer fire department. The Chamber of Commerce uses the site for spatial pictures of the business community. The co-op's GIS-enabled Web site is a vital component of the region's information system.

Hart EMC provides electricity to five counties in Georgia serving more than 32,000 members with approximately 4,500 miles of line. The co-op was founded in 1936 by a group of citizens seeking to affordably improve the rural area's quality of life. In its long history, the co-op has continued to meet this goal.

Some say that Georgia is a region with mild weather, but locals will tell you that the state has more than its share of storms that frequently cause outages. When outages occur, emergency services, public safety, and media people visit the Web site to see the status of outages and restoration of power. Hart EMC designed its own outage management system (OMS) and integrated it with Origin GeoSystems' Origin GIS software, an enterprise GIS solution built on ArcGIS. It automatically creates a model of the Hart EMC electrical system and provides that data to the OMS for outage analysis and tracking.



By using GIS data, Hart EMC's OMS application enables customer service representatives to provide up-to-date outage information to individual customers calling the cooperative. ArcIMS automatically produces maps from GIS and serves them on the Web, enabling Hart EMC's customers and others to access map-based outage information from their browsers. The site visitor sees the magnitude of outages and receives statistics about the number of people out of power, how long outages last, and how many outage calls came into the co-op's call center. ArcIMS directly accesses the spatial database, so it can generate maps that are close to real time. Outage maps are updated once every minute. Because the site automatically manages the public's storm information requests, co-op employees have more time to respond to outages and get the lights back on.



The community can access the public Web site to see the outage management systems outage tracking on a map.

Depending on the reader's needs, Web maps can be specific or general. Outage zones are represented as shaded areas. For example, if a substation is out, the map shades the entire service area of the substation. If the outage is circuit related, a shaded area of the circuit is shown. If the outage is on a line, a 400-foot buffer is drawn from the primary line. If the customer resides in the shaded area, they are out of power. In rural areas, service providers' territories are mixed so power may be off in other power providers' areas. Hart EMC's Web site posts a service provider's map, which helps site visitors determine who they need to contact for customer service.

Many rural counties do not have mapping staff to provide mapping services; therefore, Hart

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MapEdit Tool for Data Integrity

Verendrye Electric Cooperative

National Information Solutions Cooperative (NISC) is an information technology company that develops and supports software and hardware solutions for its member-owners who are primarily utility and telecommunication cooperatives. NISC provides software and hardware solutions such as Internet bill payment and presentation, graphical and mobile mapping systems, activity costing systems, and energy deregulated billing.

As a member-owner of NISC, Verendrye Electric Cooperative (VEC) sought help for integration of its operations. VEC serves more than 10,000 meters in the six counties surrounding Minot, a 4,000-square-mile area requiring 60,000 poles and 4,000 miles of line in North Dakota. VEC is seen as an innovative electric cooperative, often on the cutting edge of industry technology.

VEC implemented NISC's iVUE MapEdit. The solution provides the cooperative with an integrated enterprise GIS that includes an outage management system. The iVUE application is built on ArcGIS open architecture and tools. MapEdit shares information with VEC's customer information system, maintaining data integrity between applications. The GIS team can use MapEdit to create a circuit diagram. The solution works hand in hand with VEC's outage management system, providing a real-time graphic picture of the outages in progress.

To learn more about NISC, visit www.nisc.cc.

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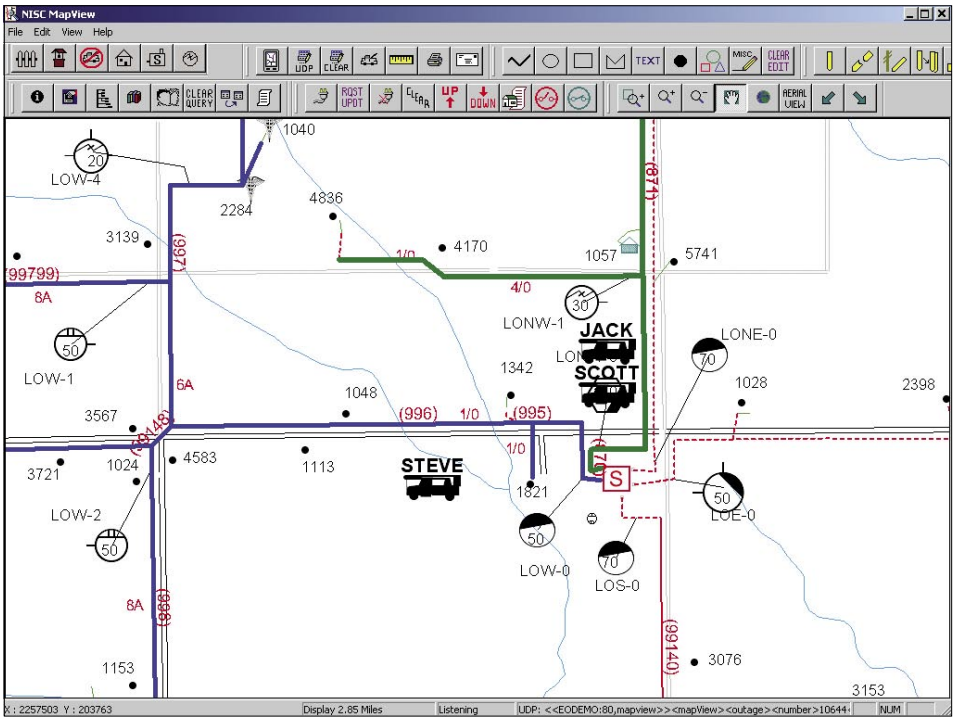

Real-Time Graphic Image of an Outage in Progress

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Vegetation Management Solutions Position Utilities for Regulatory Compliancce

Instead of clicking on a cell in a spreadsheet, now the user selects features on a map to access the database. Users click on the project area and make changes to the database via a dialog box. They still have access to their own Excel formulas and can produce reports out of either Excel or ArcMap. The vegetation management solution serves as a spatially visual interface with the data.

Their GIS application for vegetation management enables the utility company to perform vegetation inventories and assign specific work tasks with scheduled task frequency (e.g., trim now and every four years). Work orders can be spatially or task based, defined, and assigned to a crew with an accompanying map. The GIS application has additional functions such as ISA-based tree valuations and assessments, future work planning, budget management, stand collection, copy tree functions, and unlimited custom reporting. Self-customization of the data being gathered is available. The application is compatible with ArcPad software-based inventory collection programs.

TKG also found that utilities are looking to improve the work process with contracted tree trimmers. One method of providing improved interaction has been with an online vegetation management application served with ArcIMS. Contracted tree trimmers log onto a utility's Web site with a password and click on the line segments where they have completed work; this information then gets checked and merged into the master database by the utility company's staff. The application is easy to use. A simple set of navigation and search tools allows contractors to zoom in to the area of interest, click the lines or areas on the map, and indicate that work was completed via a drop-down box.

Extend the value of your GIS system by applying it to address your company's vegetation management operations. To learn more about the Kenerson Group's GIS applications and services, visit www.kenersongroup.com.

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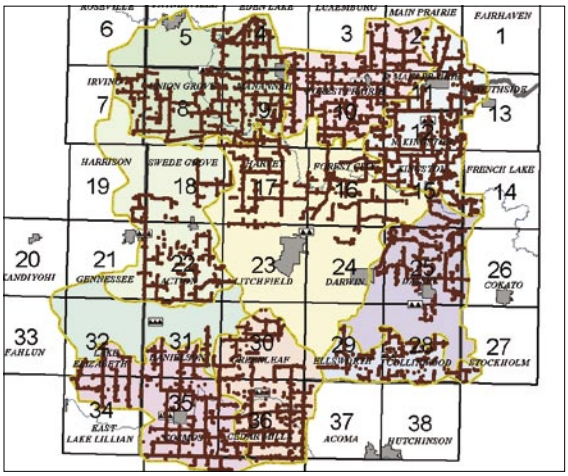
Meeker Cooperative Extends Its GIS

their computers so they can pull up any pool of information they need such as customer information. They can update the information. Transmission is through either a local area network (LAN) or our wireless network in-house. This makes it possible for us to update the field-workers' geodatabase as frequently as we like. We are currently doing updates monthly, but we can perform them weekly or daily if we want."

A staking application has become a routine tool for stakers. Meeker Cooperative was the first cooperative to have the MiniMax staking tool, StakeOut. Louis says, "We can currently take our GIS database and export shapefiles and move that into Stakeout and actually stake using our background maps. This is helpful because we do not have to draw background maps, developments, roads, lakes, existing power lines, or existing consumers. This saves us time."

Facility changes continually occur; therefore, a facility database is quickly out of date. Some utility databases are updated only once every one or two years. The StakeOut application makes it possible to capture field data and facility changes as they happen from the site. Integrating GIS and GPS technology gives a high degree of positional accuracy to the data. GPS points are passed directly to the mapping system.

A useful device that enhances Meeker's data update process is a PCMCIA card drive. This enables easy data sharing between portable and desktop systems via memory cards or hard disk cards as well as sharing of portable peripheral devices. The field-worker inserts a GPS card into the laptop and the program interfaces with the StakeOut tool. This makes it possible for drivers to see exactly where they are on a live map. The tool instantly updates staking work with submeter accuracy. field workers can stake and GPS at the same time providing instant database updates. StakeOut has proven its worth. Approximately 170–180 new services are staked in a year as well as service upgrades, road jobs, and regular facility upgrades.



A bird's-eye view of Meeker's GPS project shows amount of work completed.

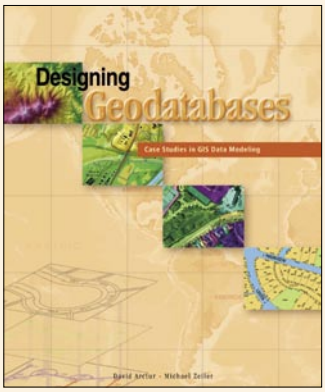
GIS is being extended to include member services. For example, registration data for co-op members who attend Meeker's customer appreciation days or annual meetings is entered into the database. GIS plots the residences of event attendees on a regional map. This shows where event participants are coming from and where the co-op needs to improve advertising efforts.

Kevin Louis continually asks, "What else can it do?" This attitude keeps the technology fresh and costs down for providing Meeker Cooperative members with quality service.

To learn more about the MiniMax StakeOut solution, visit www.minimax.net.

Outage status and response is coded by color. No power and not dispatched is red. No power and dispatched is blue. Restored power from an outage is green. Personnel clicks on a blue section to see which truck has been dispatched to the site.

Designing Geodatabases: Case Studies in GIS Data Modeling



This collection of case studies represents best practices in geodatabase designs for various application domains. These database designs are intended to help GIS users rapidly become productive with the geodatabase and to share what really works among our user and developer communities.

A series of designs derived from specific case studies are presented throughout the book including

- Streams and river networks
- Census units and boundaries
- Addresses and locations
- Parcels and the cadastre
- Federal lands survey
- Raster data use
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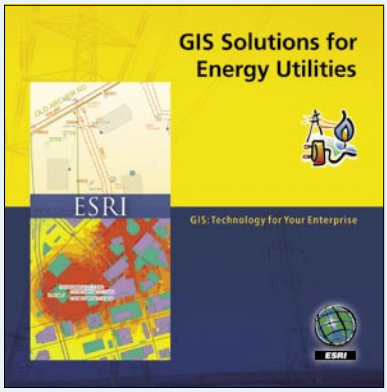
Building accurate geodatabases is the foundation for meaningful and reliable GIS. By documenting actual case studies of successful ArcGIS implementations, Designing Geodatabases: *Case Studies in GIS Data* Modeling makes it easier to envision your own database plan.

GIS Solutions for Energy Utilities



ESRI has solutions for electric distribution, transmission, and gas companies. The GIS Solutions for Energy Utilities 2004 CD–ROM contains information on leading ESRI software that can make your work flow more smoothly and your organization more successful. This CD features an overview of how energy utilities are using GIS to streamline their operations, improve their services, and stay on top of the many other issues facing them. To order this free CD–ROM, visit www.esri.com/electricgas.

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Vegetation Management Solutions Position Utilities for Regulatory Compliancce

EMC has filled the gap for the common good. The volunteer fire department, for example, can access Hart EMC's map Web site to see the locations of fire fighting attributes such as fire locations, fire districts, and even fire hydrants. Organizations, such as UPS and Federal Express, have become users of their map products for truck deliveries. The maps on the site have a high reputation for accuracy, so the co-op could get a high return on its investment. But because Hart EMC is a community organization, it does not charge public organizations and local businesses need only pay the cost of materials such as paper, binder, and ink. "We want to be a positive part of the community," says Russell Shirley, Hart EMC's manager of technical services. "We realize our civic responsibilities and try our best to be good stewards of the public's trust."

The co-op's GIS operations are based on ESRI's ArcInfo 8.3. The enterprisewide system is useful for facilities management and more. Internally, the co-op uses ArcReader and ArcGIS Publisher to distribute maps to its employees. Engineering, Customer Service, and Operations use GIS. The integrity of the GIS system strongly supports the integrity of care and concern Hart EMC delivers to its community.

Join the Celebration!

Please join us in celebrating GIS Day 2004 on Wednesday, November 17. Learn more about GIS Day, read our success stories, find an event near you, and register your own event. Visit the GIS Day Web site at www.gisday.com.

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Electric and Gas Solutions Group
Bill Meehan, Director
E-mail: bmeehan@esri.com
Tel.: 909-793-2853, ext. 1-2135

Mitchell Garnett, Manager
E-mail: mgarnett@esri.com
Tel.: 360-668-9069

Roxanne Cox–Drake, Manager
E-mail: rcoxdrake@esri.com
Tel.: 909-793-2853, ext. 1-2689

ESRI
380 New York Street
Redlands, CA 92373-8100