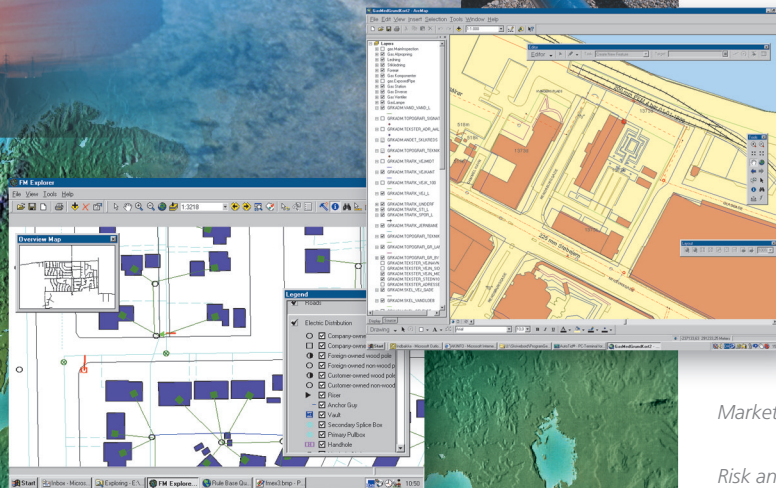# GIS for Utilities in Europe

Outage management

Facilities management

Data management

Invoicing

Asset management

Engineering

Marketing

Risk analysis

Logistics

Customer service

Site selection

Operation

Compliance

Demographic analysis

Right-of-way

Routing

Network design

ESRI—The World Leader in GIS

Because geography is an underlying attribute of virtually all aspects of a utility's business, geographic information system (GIS) technology should be a core part of your information systems. From embeddable components to professional GIS, only ESRI has the range of GIS solutions needed to spatially enable your information technology strategy.

GIS for Utilities in Europe
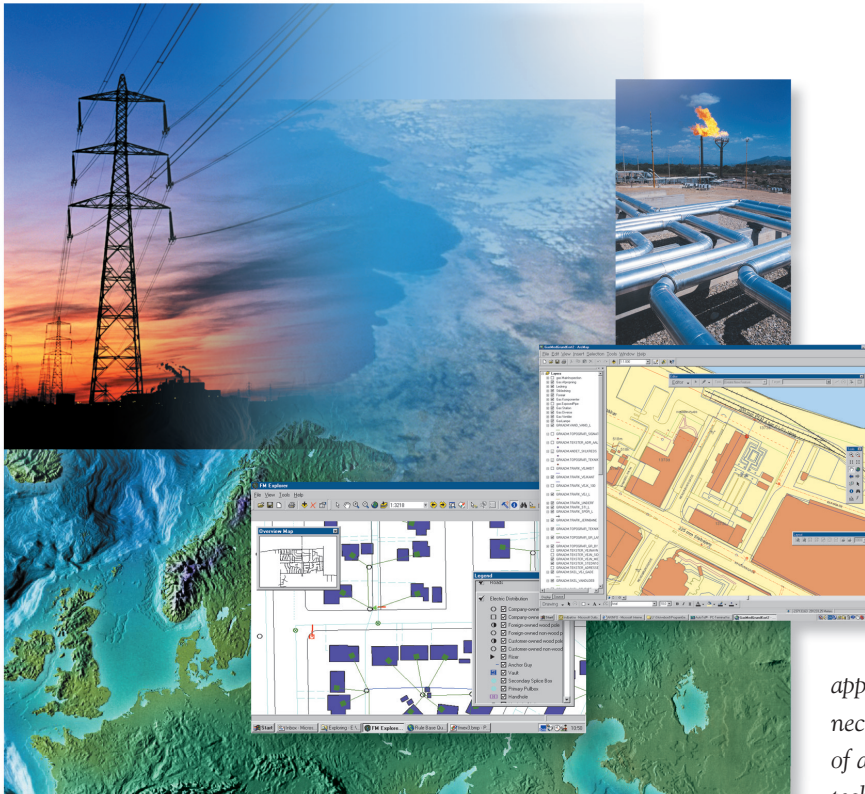
Changing business needs and advances in technology have shifted the utility industry's perspective of geographic information system (GIS) technology and spatially enabled data. Once viewed as a niche application, GIS is now a necessity, a strategic component of a utility's enterprise technology infrastructure.

The delivery service business of utilities requires faster decisions regarding asset utilisation and resource management. The retail business of the same or new utility providers requires a more intimate understanding and relationship with their customers. GIS delivers visual analysis and presentation of complex information, which speeds up the understanding and action of utility decision makers.

Whether your utility is driven by mergers and acquisitions or operational excellence, the open architecture of ESRI's GIS solution, ArcGIS™, supports your strategy for "best of breed" solutions and integration of key business processes and systems. GIS enables solutions that may focus on engineering activities, such as work management or outage management, but it can also be extended to other work activities such as land and right-of-way management, vegetation or tree trimming, and environmental studies.

As utilities consider the applicability of new technology, such as the Internet, ESRI is ready. Our Internet mapping solution, ArcIMS™, supports broad communication and reporting requirements while meeting the special needs of information exchange with your regulators, suppliers, or contractors. Additional mobile solutions, using technology advances in wireless communications and remote computing, are being adopted within utilities. Not only are ESRI's GIS capabilities a part of the utility systems being rolled out to the field, but utilities can leverage our expertise in routing, tracking, and fleet management, as well.

This brochure highlights European utilities and business partners working together to implement solutions, to deliver improved decision making and processes. These solutions and many others are spatially enabled by ESRI. For more information on how to take advantage of these benefits within your utility, we invite you to contact ESRI and our distributors.

Water

United Kingdom

Data Management System for Underground Assets

Severn Trent Water Ltd. is developing an innovative underground asset data management system. Serving more than eight million people across the heart of the United Kingdom, the company supplies nearly two billion liters of drinking water a day to the highest standards in Europe. Severn Trent Water takes away used water, treats it at more than 1,000 sewage works, and then puts it safely back into rivers and streams. Their high standard of service requires a forward thinking GIS.

ArcFM Water

ArcFM™ Water 8 provides a core solution for water, wastewater, and storm water utilities. It is a member of a family of facilities management (FM) extensions to ESRI's ArcInfo 8 that share a common look and feel, modeling approach, and tools to create an integrated solution across water, electric, gas, telecommunications, and other utilities.

Severn Trent Water Ltd. operates in an area of more than 21,000 square kilometers, stretching from the Bristol Channel to the Humber estuary and from mid-Wales to the East Midlands. This area takes in the basins of the rivers Severn and Trent and includes the City of Birmingham and 10 other major industrial cities.

ESRI (UK) has been selected as the supplier of GIS software for use in the Severn Trent Water three-year, £19 million Underground Asset Data Management System (UADMS) project. "American contractor Stoner Associates, Inc., is the principal GIS integration contractor for Severn Trent Water. It has a proven track record in fast and successful implementations such as the UADMS project."

ESRI's ArcSDE™, working with the Oracle relational database management system, ArcFM, ArcGIS, and embeddable GIS components, has been selected as the enabling technology.

Because ArcFM is an easy-to-use, out-of-the-box solution, Severn Trent Water will be able to get up and running and realise business benefits very quickly. In addition, ESRI® software provides a true enterprise solution, providing Severn Trent Water with the technological means for creating a fully integrated business system.

The UADMS project includes GIS implementation, water and wastewater system data conversion, GIS applications development, network modeling integration, supporting software procurement, hardware procurement, technical assistance, training, and maintenance support. The project uses Ordnance Survey® Land-Line, ADDRESS-POINT, and Land-Form PANORAMA products. As part of its service contract, Stoner will add Severn Trent Water facilities' details to this underlying data.

The UADMS GIS software will provide Severn Trent Water with an opportunity to standardise asset information and make it available to those who need it," says Larry Barnes, UADMS project manager, Severn Trent Water. "When this has been achieved, the company will possess the tools to provide optimised asset management and service, which is what it has always worked hard to achieve.

United Kingdom

Wessex Water Creates a Master Data Repository

Wessex Water is an established utilities company of the United Kingdom with 138 water sources, 101 treatment plants, 327 service reservoirs, 366 pumping stations, and 10,800 kilometers of water mains. Wessex Water supplies, on average, 394 megalitres of water daily to 1.2 million people in 430,000 properties.
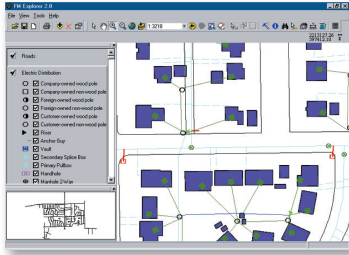
The company decided to replace their previous GIS system with an ESRI solution because they wanted to improve business processes, effect an enterprisewide view of information, and create a master data repository of sites and principal assets.

Wessex Water began working with ESRI (UK) to develop a technological and flexible corporate solution. The new system is centered on a SQL Server-hosted corporate data store that is served to a number of GIS clients by ArcSDE.

ArcFM is the Wessex Water client solution used by their advanced technical users who are responsible for maintaining both the underground and overground assets. They developed a browser using ESRI's MapObjects® software and a Visual Basic program of ESRI's called ArcFM Explorer.

ArcIMS technology provides controlled access to Wessex Water's asset information on their corporate Intranet. Thus, employees can access relevant information over the Intranet.

Using ArcFM, ArcView® GIS, and ArcFM Explorer has afforded the company an easy and comprehensive GIS transition.
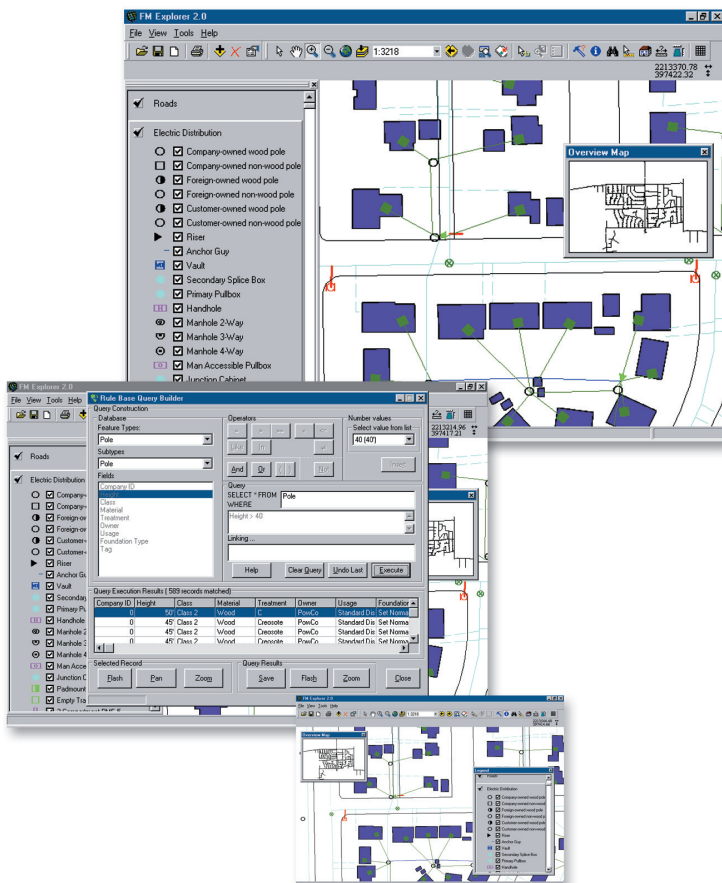
United Kingdom

Water Workers Access and Query Company Asset Database

Three Valleys Water, based in Hatfield, has invested in strategic GIS software and services from ESRI (UK) to provide enterprisewide access to asset data held within their central corporate GIS database.

Three Valleys Water is a "supply only" company that supplies water to 3 million customers in a 3,727-square-kilometer area. This area includes Hertfordshire, parts of Buckinghamshire, Essex, Surrey, and Berkshire, as well as several London boroughs.

The main drive for the purchase was to enable Three Valleys to maximise the benefits of the asset data they had captured. Simply put, the company wanted a GIS that could be used by a wide range of its employees. Management expects to see improved efficiency in the maintenance of the network as well as the level of customer care provided.

One of the key drivers in the decision to implement enterprisewide access to the corporate geographic information has been to produce reports required by the regulator. "Having reviewed the availability of enterprisewide GIS solutions, we were impressed by the level of integration and functionality of the ESRI product range," commented Jon Pratten, operational applications manager at Three Valleys Water. By increasing the number of staff who can access and query centrally held geographic information, Three Valleys expects to increase its staff effectiveness to unprecedented levels.

> Three Valleys Water is a "supply only" company that supplies water to 3 million customers in a 3,727-square-kilometer area.

Three Valleys has been using another GIS product for high-end asset management, but it was strongly limited in providing flexible end user tools in a cost-effective manner. Considering the latest GIS offerings from a number of vendors, the management team selected ESRI (UK) to provide their GIS technology and services. ESRI's ability to provide access to corporate asset information by users throughout the enterprise led to the purchase of a suite of ESRI software. These components included the premier desktop GIS software, ArcView GIS; component-based GIS software, MapObjects; and server-based GIS software, ArcSDE, which provides access to the corporate asset data. ArcView GIS is being deployed across the wide area network throughout the region using Windows Terminal Server, while MapObjects provides an interface to Three Valleys Water's WMIS Work Management System.

Spain

GIS for Daily Water Management

Aquas Municipalizadas de Alicante harnesses and distributes drinking water and also processes residual water. The company supplies approximately five municipalities with drinking water, serving from 400,000 during the off-season to 600,000 during the tourist season.

From 1987 to 1990, the municipality reconstructed its cartography system, updating it to a sophisticated GIS. The project was dubbed S.I.G. Alicante's GIS for water services is the leading technology in Spain. The GIS was developed with ArcInfo™, ArcView GIS, and MapObjects. Now the project is a well-established component of each department in the company. The GIS has become an indispensable resource for the daily management of Aquas Municipalizadas de Alicante in a multitude of ways.


Digital cartography: This function provides a set of mapping tools for viewing the location of various elements (pipes, valves, hydrants, mains, pumps, meters, etc.). It also allows for the generation and modification of blueprints by using the variables for paper, scale, and rotation as well as editing tools. A variety of users maintain the database through a full range of editing options.

Preventive maintenance: The GIS allows operators to view the characteristics of each water element such as its construction material, age, brand, and specifications. It also displays its location and accessibility. Thus a person monitoring maintenance can quickly assess the needs and respond to the individual requirements of the repair.

Asset management: The system provides an accurate accounting of facility assets. These assets are easily categorised from the overall total network down to specific district areas.

Management of failures and incidences: Before a "close in case of failure" action is actually performed, it can be digitally simulated to determine its impact. If an element were to be shut down, the system indicates who would be affected, where to reroute services (domestic or industrial), and who is on high-priority watch (hospitals and fire services).

Control of water quality: Water quality changes depending on its source of origin. By periodically accessing water analysis at a series of sampling points in the water network, the system can identify possible variations in water quality throughout the route.
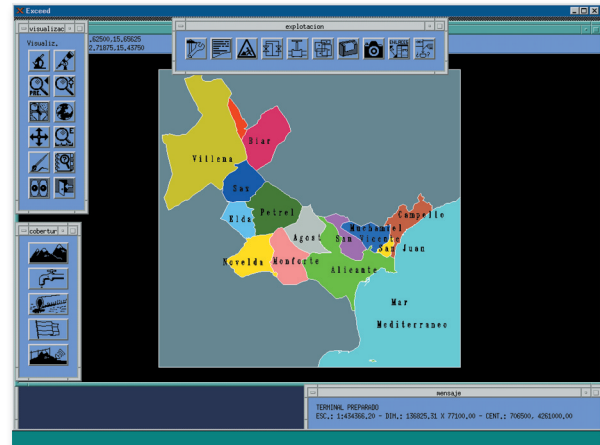
Integration hydraulic model: Hydraulic behavior on water quality can also be analysed through the simulation application. The GIS interacts with the water system by following the evolution of the flow of the water inside the pipes, the pressure in each demand node, and the concentration of any substance in the water system.

Business aid: Because this GIS highlights areas of nonservice, salespeople can decide how to focus their marketing strategies. The system also helps to locate customers for trading and billing purposes.

Adding connections: This GIS provides effective management of connections for commercial use. Managers can visualise the zone where a new client is located and determine the area's hydraulic infrastructure. This speeds up the process of both authorising and creating connections.

Sizing of pluvial collectors: GIS is employed in calculating the parameters of the size of pluvial water collectors. This assures optimum geographic location and appropriate capacity for the collection of rainwater.

The managers of Aquas Municipalizadas de Alicante are certain that the larger and more complex their water distribution system grows, the greater their daily dependency on their GIS will be.

Poland

AQUA in Bielsko-Biala

AQUA, a water company in Biel-
sko-Biala, Poland, offering services to
more than 250,000 users has imple-
mented a software package based
on ESRI software and designed by
Hanslik Software Laboratory (HSL).
The interoperability of the GIS
system is well exemplified by AQUA's
management of its water and sewer
facility. The final architecture of this
project is based on ArcSDE 8, Oracle 8i,
and a set of transactional GIS editing
and analysis tools developed specifi-
cally for water companies by HSL.
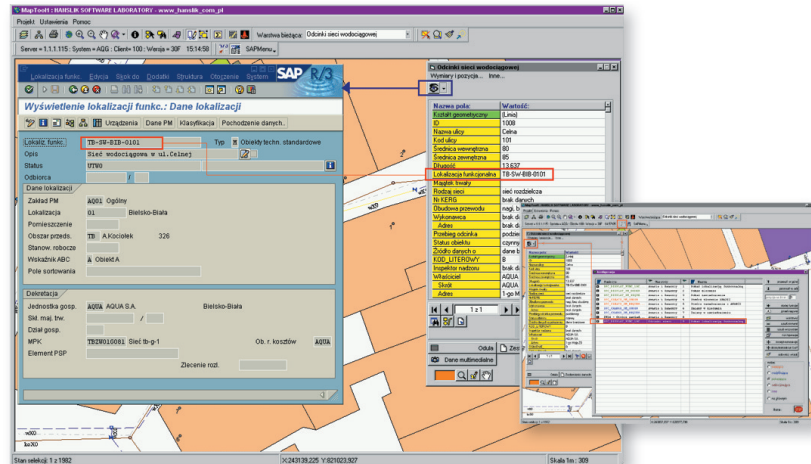
Fundamental acquisition and validation of spatial and nonspatial data are the rudi-
ments of a GIS system and so became the initial focus for implementing AQUA's
system. An integration between AQUA and the City's GIS systems was developed as
well. This included modeling and computation between systems as well as rendering
third party solutions for heat balance, water and sewer hydraulics, and electrical
power.

The GIS's data-transfer functionality allowed AQUA to use Bielsko-Biala's land base
databases. AQUA easily receives City data such as addresses, parcels, and building
information in a mutually acceptable format. The system is now able to link location
reference data with customers, maintenance events, planning, and meters. In return,
AQUA delivers utility data to the City.
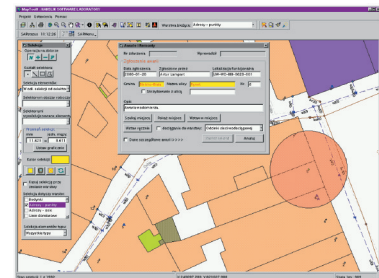
Facilitating efficient interaction between spatial data and business data systems
requires integration with Enterprise Resource Planning (ERP) systems. AQUA's GIS
system was designed to integrate with SAP R/3 at the very outset of the project, using
ArcSDE for accessing SAP functionality. The design also offers GIS viewing from
the SAP system. The use of an Intranet greatly facilitated the dispersion of GIS data
and functionality among AQUA staff.

The GIS system will continue to be a strategic investment for AQUA because of its
integration systems such as SAP R/3, billing, modeling maintenance, and customer
care. These systems can be related to a single, spatially enabled database. Interoper-
ability allows GIS maximum functionality amidst a variety of systems.
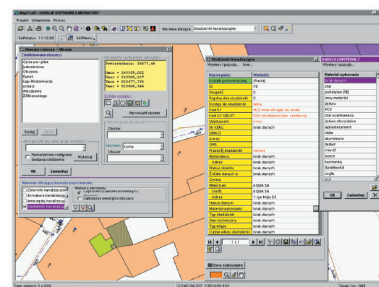
Electric

NESA Denmark

NESA Denmark Electricity Supplier Upgrades System

Danish electricity supplier NESA has long set standards in GIS utility management. NESA's grid area includes northern Zealand, the municipalities in the Roskilde area, and most of the municipalities of Greater Copenhagen. This is an area with a population of one million and that has thousands of commercial enterprises. NESA's electricity grid supplies almost 530,000 connections, of which approximately 467,000 are residential units—the rest are business enterprises, shops, schools, and so forth.

NESA has been a longtime user of ESRI's software. The current ArcFM software platform is based on ESRI's ArcInfo 8 technology, with an ArcFM Energy and ArcFM Designer application on top. The data is stored in Oracle and accessed through ArcSDE.

NESA demands a high cartographic standard since their maps are handed out to contractors working in areas with NESA electric facilities. These maps need to contain warning signs and remarks about ongoing work. High-voltage cables in the working area, for instance, prompt NESA to warn contractors to take special care. All maps that have been handed out are kept electronically in an archive for documentation.

Integrating ArcInfo 8 and SAP business solutions makes it possible for NESA to capture the benefits of both systems. Whenever a new electricity project is under construction, the new features are drawn, edited, and validated in the GIS while SAP updates the material list. Material lists, therefore, always contain the exact items needed for the project. Furthermore, SAP keeps track of the demand for man-hours. SAP and GIS allow the user to perform advanced analysis on costs and network capacity.

The underlying data model is based on the electric model of ArcFM Energy and is modified to fit NESA's exact needs. This is done by removing unused feature classes and by adding attributes that complete a model that is compliant with NESA's requirements.

The finalised application will be integrated in NESA's organisation so that all construction will be done in this environment. Therefore, the database will be utilising ArcSDE features supporting multiuser editing and versioning.

ArcFM

ArcFM offers intelligent sets of objects that represent the behavior and the characteristics of energy utilities. ArcFM 8 allows utility businesses to make use of a single, integrated environment for managing utility information. It takes advantage of new standards in geographic data models, tools, and applications, leveraging all the power of ArcInfo software's object-oriented architecture.
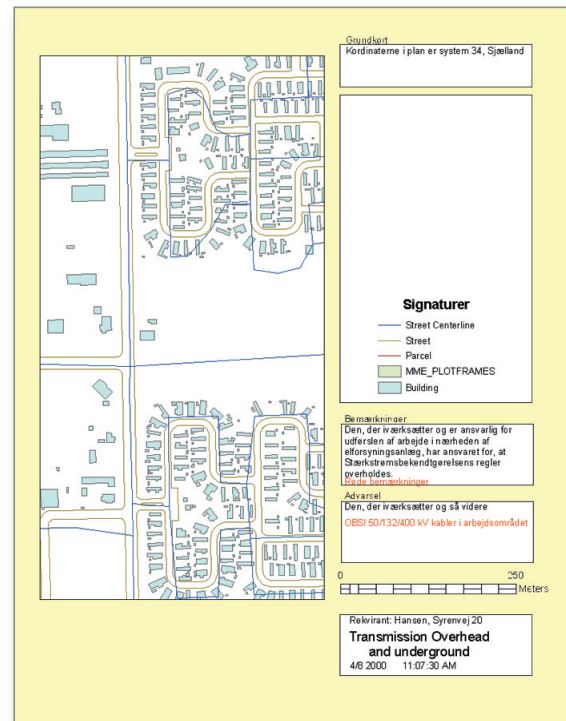
Austria

Austrian Electric Company Plugged In

Energie Steiermark–STEWEAG, the fourth largest electrical utility in Austria, is a longtime user of GIS technology. The installation has steadily grown to encompass a wide variety of software and applications.

For the last six years the Geomet application has detailed the location of the company's middle- and high-voltage lines in relationship to cadastral maps to facilitate the notification of property owners in the event of emergencies or construction activities.

STEWEAG utilises ESRI software for more than mapping. As an example, STEWEAG has also linked the GIS to their billing system. The next steps are to move their data into a spatial database engine using ArcSDE and install an Internet map server (ArcIMS), to provide rapid Intranet access to the GIS.

The company will test an interface between their GIS and SCADA system, which will allow them to geographically locate electrical system faults.

GIS allows STEWEAG to more efficiently plan and design cost-effective solutions to serve their existing customer base and help in the identification of potential new customers and new opportunities.
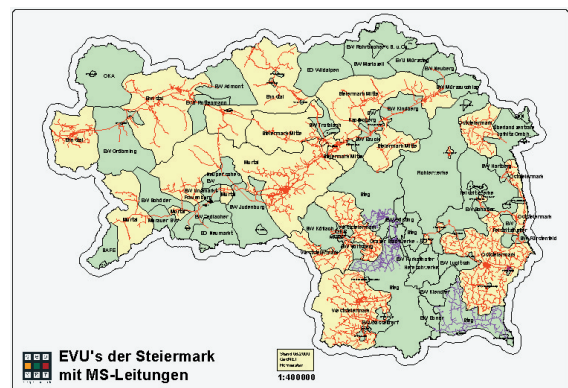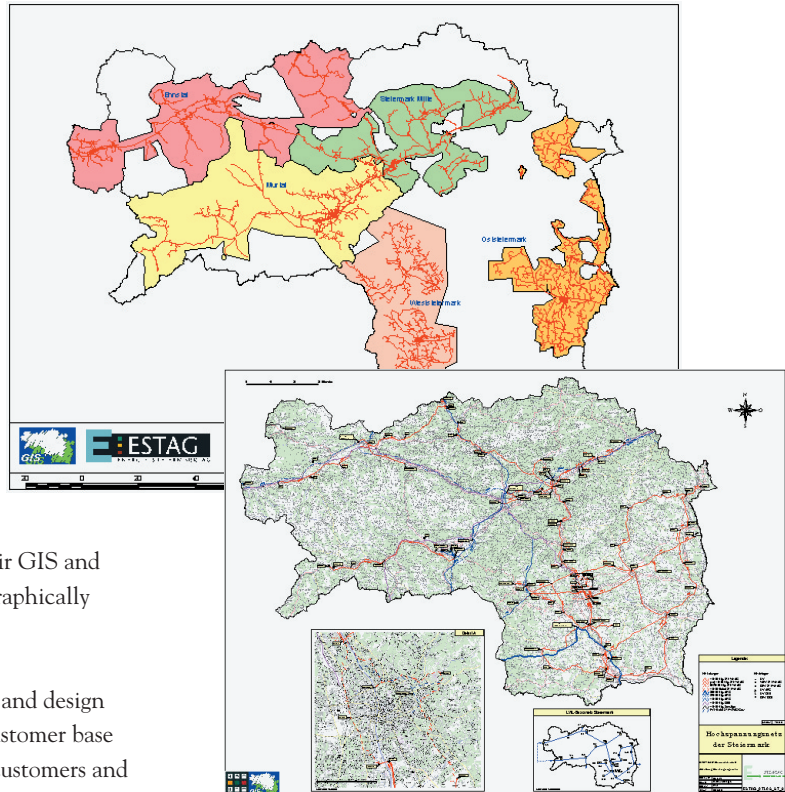
Czech Republic

IT Supports Energy Business Goals in West Bohemia

The dominant electricity supplier for West Bohemia in the Czech Republic is Západòc eská energetika (ZCE, a.s.). Since 1994, when it received State authorisation to provide the region's electricity services, ZCE, a.s., has had the objective to "strive for transformation into a modern, dynamic business." ZCE, a.s., belongs to a group of eight Czech Republic distribution electricity utilities. These utilities ensure transmission and distribution of electricity in high-voltage, middle-voltage, and low-voltage networks and the electricity sales to customers in the region. ZCE, a.s., is intent on achieving its modernisation goal.

The EnGIS solution is developed on ArcInfo with an Oracle database. The UNIX-based application fits nicely within the existing information infrastructure of the company.
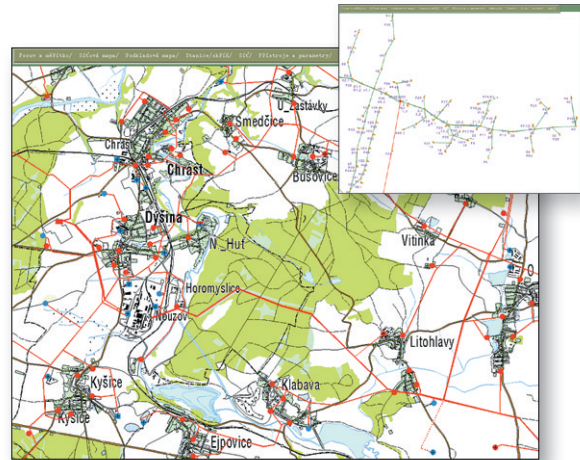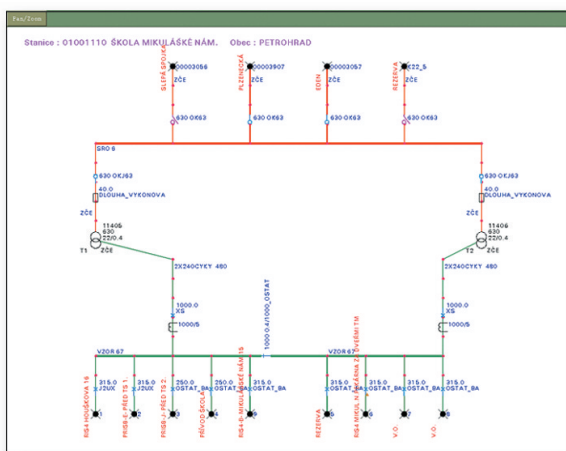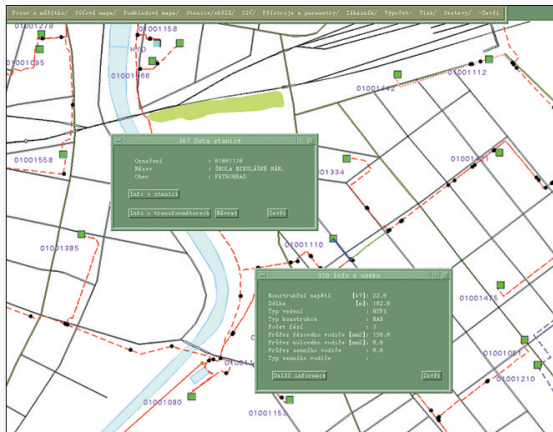
Three main information layers are incorporated into EnGIS: electrical networks, wiring, and equipment. The network allows for an active user approach.

Topology, or connectivity, is preserved in one-pole schemes of electrical stations including transformer stations and substations. The EnGIS solution functions similarly to a computer-aided design (CAD) system. However, the topology assures that the link between the outdoor electric network and the station schemes are maintained.

Another stated goal of ZCE, a.s., is to "ensure efficient requirements of customers in corresponding quality, time, and amount for reasonable costs." The EnGIS system easily locates calls by customers and also determines the caller's type of connection hookup. This service increases customer response time for outages and requested services. Should a scheduled electricity supply cutoff be required, the system can generate a letter announcing the cutoff to those customers who will be affected. The breakdown localisation function can also initiate a search for substitution power feeding routes.

EnGIS provides a sophisticated link to the customer information system. By combining the customer information system with network calculations, failure localisation and the scheduling of outages have resulted in higher efficiency.

The integrated EnGIS system brings ZCE, a.s., toward its company goals in a way that benefits both the company and its customers.

# Sweden

Utility Applied Map Rendering

A GIS innovation in map rendering, GISELA has become well-suited to the utility industry in Sweden. GISELA is based on ArcSDE, MapObjects, GeoPres (an addition to MapObjects and extension to ArcView GIS for unified presentation of digital map information), and SDE Online Editor (SOLE). GISELA was developed by LandFocus IS, a sister company of ESRI Sweden.

The GISELA client can access all information on power lines and transformers including CAD drawings, lists of components, parcel information, all relevant data about concerned landowners and concessions, and also online displays of lightning strikes in northern Europe. All objects can be displayed at their true positions with background mapping from the Swedish National Land Survey.

From the GISELA client, the operator can start with an overview map, zoom in on another map, identify a power line,
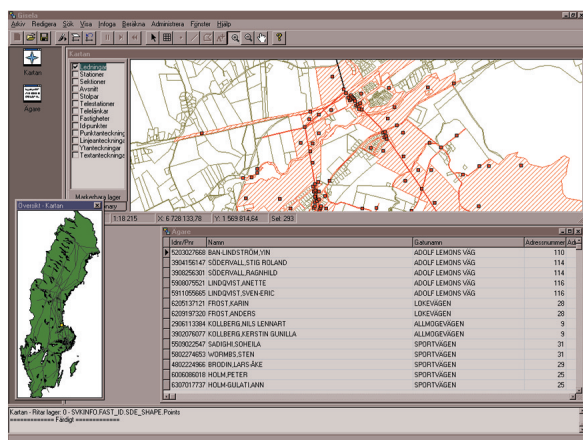
point at a transformer station, click to get an AutoCAD drawing of the station, point at an object, and get a list of components. Information about all the real estate over which the power lines are passing is in another database. If there is a need, all owners of parcels underneath high-voltage lines in
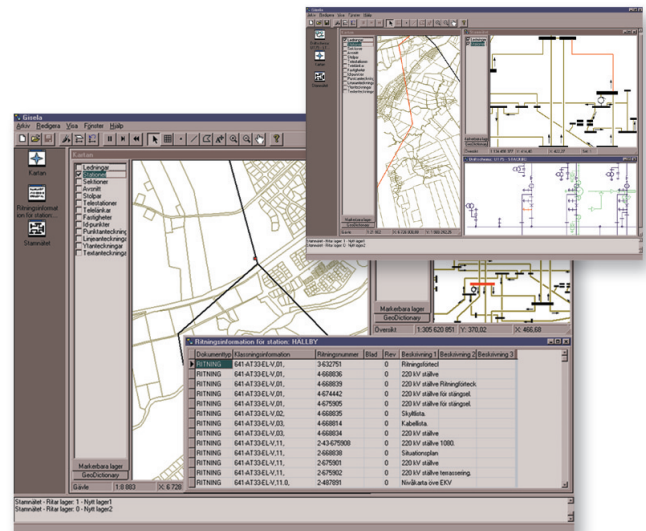
northern Europe can be displayed with a maximum five-second delay to warn service technicians who are working aloft on the 300-foot-high poles. Statistics on population are connected to the parcels, so new power lines can be planned in corridors where their population characteristics are optimal.

Svenska Kraftnat, a company responsible for all high-voltage (i.e., above 400 kV) electricity distribution in Sweden, uses GISELA in its power management operations.
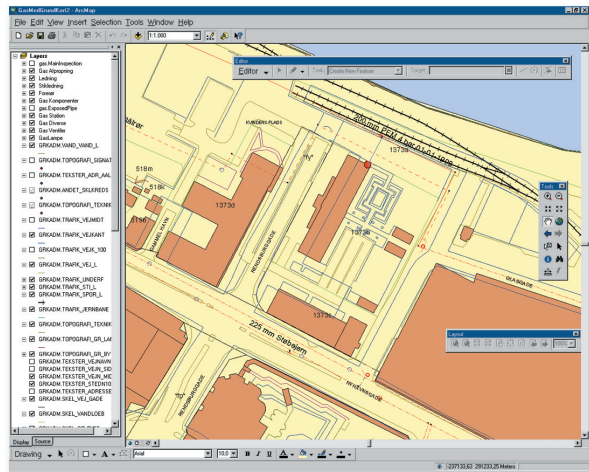
GISELA exacts high technology yet allows simplified update procedures. This accessibility ensures its acceptance and survival in the utility industry.

Utility Services

Aalborg, Denmark

### Municipal Utilities Form GIS Group

Aalborg, the fourth largest city in Denmark, has the resources to be in the forefront of technological information developments.

The municipality itself offers utility services through its departments of Gas, Electricity, District Heating, and Water. For the last 12 years, Aalborg registered its utility lines by using a CAD system. During that time period, the conversion from analog to digital data sets was completed. However, the municipality aimed at improving not only its access to alphanumeric data in the database, but it also wanted to acquire sophisticated registration tools and storage environments. Therefore the Municipality of Aalborg selected ArcGIS of ESRI as their spatially-enabling software technology. The Municipality worked closely with the local ESRI distributor, Informi GIS.

The software used includes ArcInfo 8, ArcSDE 8, Oracle, ArcFM, and ArcView GIS. The hardware list includes PCs and servers based on Microsoft Windows NT. The different departments are connected to each other with a 100 Mbit network.

The GIS group implemented the ESRI solution department by department, completing the conversion for all utility services within a five-month time frame. The team used a similar phasing-in plan for each department's transition.
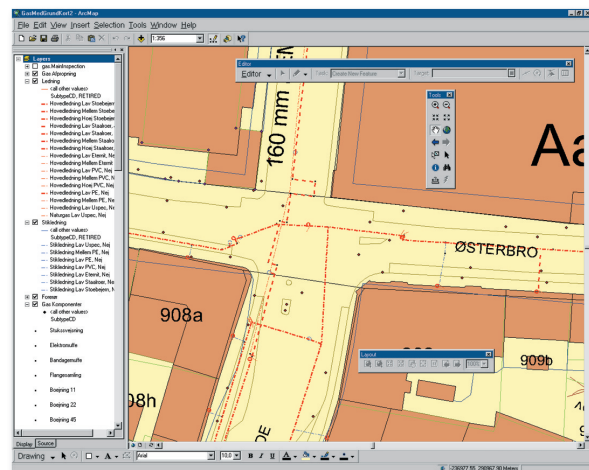
Business Partners

ABB is the world leader in providing advanced systems for coordinated planning, engineering, reliability, operation, and maintenance of power distribution systems to electric utilities. ABB's CADOPS™ software is the answer to distribution management needs in the deregulated environment—improving utility effectiveness by providing advanced engineering applications, trouble analysis, and outage and restoration management. CADOPS runs in conjunction with ArcGIS software and is just one of ABB's suite of integrated software products that is geared toward helping utilities provide the best possible customer service while keeping in mind cost-saving needs. ABB is part of ESRI's OpenFM Initiative.
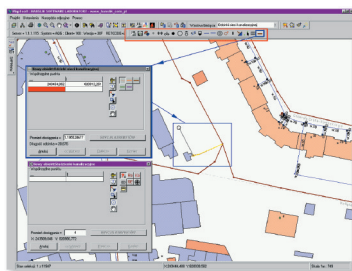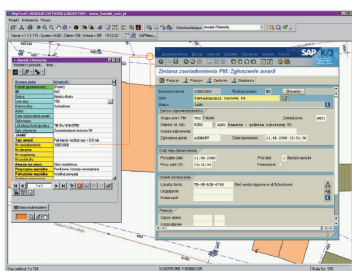

HANSLIK POLAND

Hanslik Software Laboratory (HSL) is a company that has taken the lead in software support services in Poland and Germany. Researching and developing large solutions for utilities and municipalities, HSL works closely with ESRI as well as with Oracle Corporation. HSL's mission is to develop interoperable GIS systems for power and water companies. To provide effective interoperability, HSL focuses on integrating databases with adjacent GIS systems, SAP to GIS systems, as well as incorporating an office Intranet GIS.

NetGraph Information Technology S.A.

NetGraph Information Technology (NGIT) designs, develops, and sells a range of software products and solutions allowing graphic representations to be automatically generated from network descriptive data. NGIT is committed to being the premier provider of solutions for the automatic representation and graphic use of alphanumerical data within network management applications.

NG Spatial is a specific application of NGIT integrated into ESRI's ArcInfo 8 product range and designed to address the documentation and asset management needs of large public utility networks. To that end, it is interfaced with ESRI's tools that bring the necessary additional schematic functionalities.
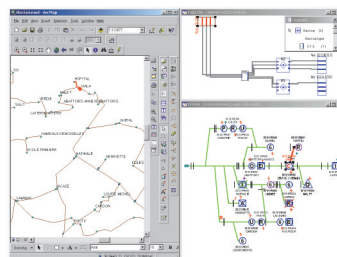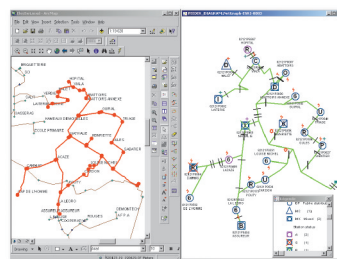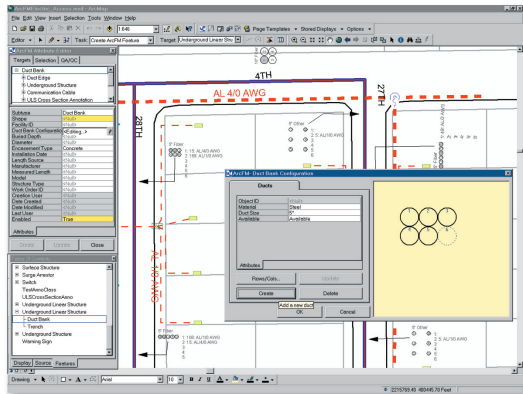
Business Partners

Miner and Miner

Consulting Engineers, Inc., Miner & Miner, has been an electrical engineering company for more than 50 years. Since 1980, Miner & Miner has been involved in AM/FM/GIS solutions based on ESRI technology. Miner & Miner is committed to this market and to ESRI as a GIS vendor. The firm has been a driving force behind utility-specific enhancements of ESRI technology. ArcFM, as a Miner & Miner product, has become an ESRI brand name that is developed and maintained by Miner & Miner.
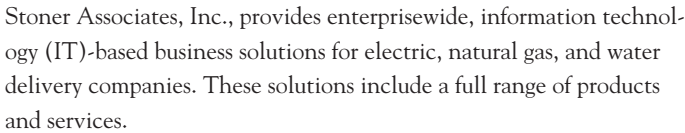
Miner & Miner's European office was established in Copenhagen in 1998. Together with a European special interest group, the firm has extended the original North American data model to meet the European requirements. Miner & Miner is constantly working on the improvement of solutions by listening to customers.
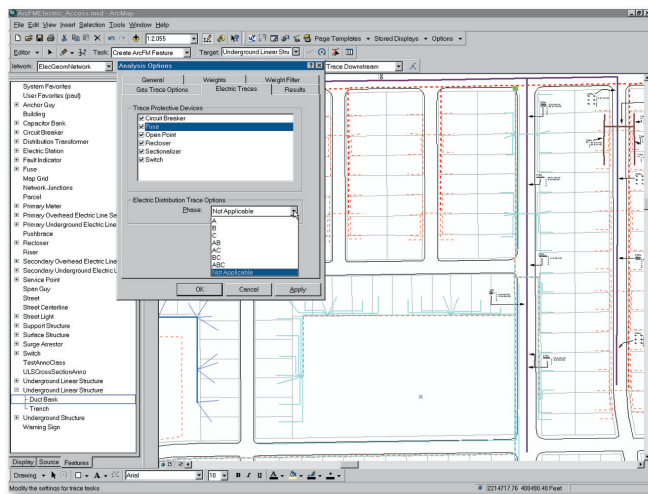
Miner & Miner's core product is ArcFM Energy. In 2000, ArcFM was acknowledged as the best ArcInfo 8 application. It includes an electric and gas data model and gives specific tools for mapping and managing network information.

Miner & Miner's software is called "A Framework for Integration." The following Miner & Miner products are based on ArcFM:
- Designer, which acts as the integrator tool to work management systems such as SAP
- DistOps, which enables integration to external network analysis engines
- Responder, which spatially enables outage management systems and integrates to SCADA and other systems

Stoner

Stoner Associates, Inc., provides enterprisewide, information technology (IT)-based business solutions for electric, natural gas, and water delivery companies. These solutions include a full range of products and services.

Known worldwide for its SynerGEE product tailored to the unique modeling needs of system planning engineers, Stoner now also develops SynerGEE Solver-based applications interoperating with GIS-based applications to provide end-to-end network performance knowledge to design and maintain operations by professionals. Moreover, Stoner develops custom PC and Web applications of all kinds for users in all enterprise functional areas.

Through its "solutioneering" practice, Stoner provides comprehensive professional services for spatial integration projects ranging from short-term, limited scope to multiyear, broad scope engagements. Stoner's professional services include extensive integration, implementation, IT, and engineering capabilities.
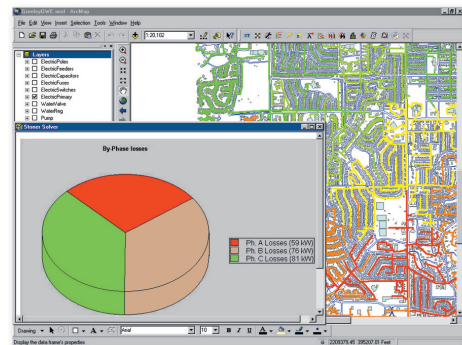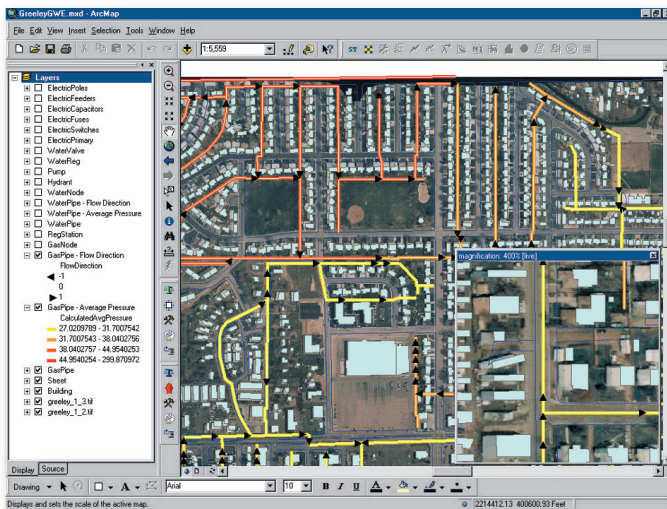
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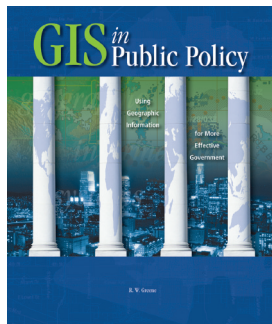
GIS in Public Policy
R.W. Greene

GIS is becoming more and more an integral part of the public policy process, especially as the efficiencies of the digital age become ever more pervasive. *GIS in Public Policy* shows how policy makers and those on the front lines of government service are putting GIS technology to work—not only in carrying out the will of voters and legislators but also in helping to inform and influence those decision makers.

With a preface by Ann Azari, former mayor of Fort Collins, Colorado, and former member of the board of the National League of Cities, *GIS in Public Policy* vividly shows the very real benefits of this new digital tool for anyone with an interest in, or influence over, the ways our institutions shape our lives.

From R.W. Greene, staff writer for ESRI and former fellow of the Kiplinger Public Affairs Reporting Program at The Ohio State University School of Journalism