Ameren Illinois

CASE STUDY
Preventing critical asset failures with Ellipse APM
Like most utilities today, Ameren Illinois must contend with aging assets, resource and budget constraints, and a workforce in transition. To keep assets operating and power flowing, Ameren needed a solution to better predict asset health and prevent the failure of its vital substation equipment—especially with their oldest transformers in operation for more than 40 years. Ameren also recognised the need to move from traditional time-based maintenance methods to a more cost-effective, risk-based maintenance program.
The client

Ameren Illinois delivers energy to 1.2 million electric and 816,000 natural gas customers across a service territory covering more than 1,200 communities and 43,700 square miles. Ameren is the state’s second-largest regulated energy company and the only utility in the state delivering both natural gas and electricity.

Ameren’s mission: to power quality of life.
The challenge

The US state of Illinois is beset by wilting heat in the summer, snow, ice and freezing wind in the winter, and occasional floods and tornadoes in the spring—wreaking havoc on the electric power infrastructure. These challenges exacerbate the normal issues utilities face in keeping a steady stream of power flowing to customers, including aging assets, resource and budget constraints and an aging workforce.

Ameren Illinois, a subsidiary of St. Louis-based Ameren Corporation, faces these and other challenges in its efforts to keep the lights on for 1.2 million customers covering 80% of the state. Ameren Illinois has more than 1,200 substations over 4,500 miles of transmission lines and 46,000 miles of distribution lines that need to be maintained and upgraded, involving thousands of transformers, circuit breakers, and other assets.

Like most utilities, Ameren carries out regularly scheduled maintenance activities/inspections to monitor and maintain its grid infrastructure. Whilst these inspections are helpful in detecting obvious or crisis-level issues, they are less effective in detecting hidden underlying conditions that could lead to potential failures.

Additionally, Ameren is buried in data—with potentially millions of data point inputs for asset health evaluation. However, much of this critical asset data resides in various organisational silos—nameplate, dissolved gas analysis, inspection, oil test results, electrical test data and maintenance data—and is not easily accessible for asset health analysis and performance forecasting.

Ameren needed a solution to leverage its data to better predict the health of its assets and prevent the failure of its vital substation equipment, particularly transformers that had been in operation for 40 or more years.

The company sought out an asset performance management (APM) solution that could aggregate data in near real-time to better predict asset life and help them transition to a maintenance paradigm based on the asset’s condition and risk of failure. This would require:

• Software capable of analysing Ameren’s thousands of transformers to identify any potential risk of failure before a problem materialised and became a critical failure

• A solution that crossed over multiple organisationally siloed systems to aggregate and learn from key asset data residing across the business

• A solution that provided the predictive information needed to move from a reactive to a proactive asset management process

Ameren’s search for visibility into timely data and a flexible, systematic and repeatable model eventually led them to one solution: Ellipse® APM, part of the ABB Digital Enterprise portfolio.
The solution

With the Ellipse APM solution, Ameren can take advantage of the embedded asset performance models to identify degrading conditions and asset risks, whilst taking their relative importance into account to determine risk level. Unlike most predictive maintenance solutions that merely identify issues, Ellipse APM utilises ABB’s decades-deep industry knowledge and advanced technology to provide expert recommendations and priorities for resolution, analysis and mitigation.

Ellipse APM ensures that identified risks are reliably measured for impact, and mitigation is suggested based on this data, resulting in significantly fewer outages. Ellipse APM also lowers maintenance costs by reducing ineffective time-based practices with risk-based assessments.

Ellipse APM provided Ameren an unparalleled fleet-wide view of their assets with connected asset lifecycle management workflows delivered via a world-class, secure and extendible analytics platform. Through the solution’s consolidated analysis, Ameren was able to gather vast amounts of information on each asset from multiple data silos and evaluate them to determine the health of their assets and manage their risk. Upon implementing the Ellipse APM solution, Ameren prioritised the high-risk transformers for immediate attention based on asset risk.

Furthermore, the system’s structured knowledge capture makes it possible for Ameren to capture best practices and institutionalise this knowledge through easy-to-use online progress diagrams, forms and training tools. Combined with streamlined workflows, this process helps to maximise worker productivity for Ameren’s young and transitioning workforce.

‘The asset models built into Ellipse APM software enable us to reduce ineffective time-based practices and maximise resources, eliminating a huge backlog of data input for our maintenance engineers’.

Donald Borries
Supervising Engineer of Substation Maintenance
Ameren Illinois
The results

Positive results were rapid: Within the first 90 days, Ameren had entered more than 2,000 transformers into Ellipse APM and was beginning to use the insights delivered by the solution to make critical asset maintenance decisions. The system identified a transformer that was headed for failure, prompting Ameren to take action—saving Ameren from lost revenue and their customers from an unexpected outage.

Leveraging existing Ameren’s digital infrastructure and data, in conjunction with ABB’s highly sophisticated, industry-specific asset performance models, Ameren is now able to run configurable predictive analytics and prioritise maintenance based on risk and asset criticality.

The Ellipse APM solution is comprised of a holistic health model and predictive analytics that combines the utility’s large volume of data across thousands of assets, turning this data into actionable information. Accessing critical asset information is now easier than ever for Ameren’s maintenance engineers: Instead of having to navigate three to four disparate systems, they have a ‘one-stop shop’ with Ellipse APM. Ameren also immediately recognised an impact in the reduction of scheduled time-based tasks based on the fleet-wide visibility of actual performance data for thousands of critical Ameren substation assets.

The benefits of a proactive asset management process with Ellipse APM:

- **Decreased operating costs**: The shift from time-based to risk-based maintenance is expected to save significant waste (both time and expense) on unnecessary maintenance. Risk-based maintenance has the potential to lower capital expenditures by extending the economic life of existing assets and reducing future O&M costs.

- **Enhanced work efficiencies**: Ellipse APM collects and consolidates disparate data, providing maintenance engineers with constantly updated, vital information that highlights risks and key actions to take, resulting in a simplified and safer maintenance process.

- **Improved services**: The predictive maintenance solution not only maximises resources and aids maintenance engineers, it also equips Ameren to better serve its 1.2 million customers with the capability to mitigate and prevent asset failure events better than ever before.

- **Better resource allocation**: With the ability to prioritise high-risk transformers for immediate attention based on asset risk, Ameren is able to more effectively plan for asset replacement costs and allocate appropriate resources and maintenance budget efficiently to help the utility capture bottom-line operational savings.
'Ellipse APM provides the knowledge and expert recommendations to prevent critical failures and optimise maintenance, increasing reliability and lowering maintenance costs and capital expenditures'.

Donald Borries
Supervising Engineer of Substation Maintenance
Ameren Illinois