Blackout 2003: Prevention and Planning Are the Best Cures

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While it is still unclear whether a transmission line failure or plant shutdown triggered the massive blackout across the Northeast last week, what is clear is that the fault propagated without limit. The performance of the grid will ultimately depend on automated engineering and control systems provided by firms such as ABB, ESCA, or Siemens; however, information technology will play a role.

Many information technology vendors will be approaching transmission owners, distribution companies, and generation plant operators with systems to prevent another Blackout 2003. However, energy companies should approach with caution any vendor that claims a new, comprehensive reliability system.

The Bottom Line: Energy companies already have the basic applications, but promising new technologies will help prevent outages and plan for future physical infrastructure.

What It Means: Publicity surrounding the blackout will put greater pressure on energy companies to act now to shore up reliability. There are two forms of reliability that companies will need to address: equipment performance and the transmission and distribution grid. Energy companies must monitor their assets more closely to prevent equipment and network failure, but ultimately there will need to be planning for new infrastructure.

Use Condition-Based Monitoring and Predictive Maintenance To Avert Potential Failures
The best approach for preventing widespread failure is close monitoring of each asset within the network. An early warning system dings potential failures so that there is time to react. If the time window is wide enough and other conditions are right, the turbine, transformer, or section of network can be taken offline and repaired or replaced, thereby averting failure. If there is not enough time, energy can be diverted around the problem.

Energy companies need to take these steps:

Enhance existing EAM and WM applications with plug-ins for scheduling and RCM. Scheduling modules in work management applications speed work turnaround, while reliability-centered maintenance provides the analytical tools to determine the optimal maintenance schedule. Enterprise Asset Management (EAM) vendors with experience in Energy, such as **Indus**, **MRO Software**, **Mincom**, **Intentia**, **IFS**, and **J.D. Edwards**, have experience working with each.
The Takeaway: The advanced application architecture of the latest EAM applications makes integration with new modules by the same or other vendors easier.

Allow access to control data for fault identification. There is already an active control system in place--Supervisory Control and Data Acquisition (SCADA) and energy management systems. Data historians make control data easily accessible for analysis. **OSIsoft** has the largest presence in transmission and distribution. Its experiences with Idaho Power and the

California Independent System Operator are particularly notable. **InStep**'s *eDNA* is used by Southern California Edison to facilitate interfaces with five separate GE Harris SCADA systems widely distributed throughout the territory.
The Takeaway: Most utilities already use data historians in their engineering departments; IT should seek out these tools and support engineering in applying them.

Allow access to monitoring equipment in the field to identify potential failure. SmartSignal has applied its experience in the Airline industry to the statistical analysis of condition data for generators to identify potential generator failures at companies such as Entergy and Dynegy. Look also at new approaches to monitoring transmission line sag.

The Takeaway: Work with engineering to determine whether there are enough of the right monitors in place to perform a robust analysis. Develop a business case to determine whether it is worth the investment by operations to add more.

Put in place the connections to initiate a work process to address a problem asset. SAP's EAM product is linked and in production with data historians like PI to automate the creation of work orders to investigate, repair, or replace an asset. Similar links are developed between EAM applications by Indus, MRO Software, and J.D. Edwards.
The Takeaway: Keep tabs on how these links are working as they come into production, as there are still lessons to be learned.

Portals provide the right information to engineering supervisors. Condition-based monitoring is best paired with historical repair histories for determining the best approach to repairing or replacing a failing piece of equipment. TransAlta has a notable portal for engineering supervisors that serves up PI data, asset content from **NRX**, repair history on the asset from **SAP** and other outside data services through SAP's *xApps* architecture.
The Takeaway: Just having access to condition data is not enough. Energy companies need the right analytics to quickly determine whether there is a problem, and initiate the proper maintenance approach.

Engineering services may be required. Complex problems may not easily lend themselves to automated solutions. Vendors of EAM applications also offer add-on engineering services to be used in conjunction with software to determine the right maintenance or repair approach for a piece of highly engineered equipment or process. Companies such as **Data Systems and Solutions** (a division of **SAIC**) and **Invensys** have these services.
The Takeaway: Take stock of your resident expertise and their capabilities; in-house resources may be able to use the analytical tools to construct specialized approaches at a lower cost.

Planning--Using Network Data To Support an Infrastructure Investment Strategy
New infrastructure investment is needed to replace aging pipes and wires, or add new substations, transformers, and other infrastructure, especially in areas of high load growth. Energy companies probably have more data available on the operation of their infrastructure than any other manufacturing or service industry, just because of the nature of power generation and delivery. Again, the wealth of data made available through data historians can also be used for planning purposes. Some promising new concepts and existing applications are out there that can help energy companies use that data:

Use meter data at the substation level and below. The data can help you assess the need for new distribution infrastructure. Oneok and Xcel Energy are at the beginning stages using **Silicon Energy** technology recently acquired by Itron**.** Others worth a look include **CES International**, systems integrator **The Convergent Group**, and SAIC.
The Takeaway: This approach is still at the experimental level, so companies whose business model is built on T&D will want to invest in pilots.

Investigate planning and design tools for new transmission. **CGI** through its acquisition of **Cognicase**, and Itron through its acquisition of **Linesoft** and niche vendors **PLSCADD**, **Cook/Hurlbert**, and **Enghouse**, have transmission and distribution design functionality. ABB has tools that will aid in transmission siting.
The Takeaway: Barriers are likely against location of new infrastructure, so look for design tools that can aid in taking advantage of existing rights of way.

Conclusion: The pressure is on for energy companies to improve on reliability. However, it is still unclear who will be responsible for the lion's share of the investment--the federal government, the transmission owners, the transmission operators, the generators, the stockholders, or the ratepayers. With such tight capital markets, particularly for energy, companies will need to invest in infrastructure before there is cash available to do so. Energy companies will be better prepared for infrastructure investment, making relatively smaller investments in information technology the next 18 months. By then, the major dollars will be available for the iron in the ground.