

Reading Report 2

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Summary

On August 14th, 2003, a large-scale blackout originating in Ohio and affecting several areas of North America in the USA and Canada occurred. Estimates of the impact indicate that up to 50 million people and load of 61,800MW were involved. Some areas did not regain power again for 4 days straight, and some areas experienced rolling blackouts for over a week! Unlike the blackout in Europe from the first reading, there was no specific event like the boat passage that caused this system failure. After the task force analysis, it seemed like the main causes of this event were system inadequacies, equipment deterioration, and poor tree growth management. Additionally, the event was prolonged considerably due to originally not having adequate knowledge of the system, and then diagnostic inabilities later.

In response to the event, the governments of the USA and Canada formed a task force to analyze the cause or causes of the event and make recommendations to help avoid a similar occurrence in the future. The NERC, or North American Electric Reliability Corporation, is a non-governmental agency that sets and enforces many standards in regards to large/interconnected power systems and also provided an analysis on this event.

Though it can be difficult to control and isolate blackouts, especially when systems are large; span several different towns, states, and even countries; and are operated by many different parties, the NERC exists to provide a standard for the US, Canada and Mexico to help reduce discrepancies across all of the differences in subsystems.

What Was Handled Well

So many different groups were involved with this large outage, it is difficult both to lay blame on one particular party as well as to give credit to any one party for performing well. Some examples of well-controlled faults that occurred on the same day or soon before the majority of this event include:

Cinergy transmission line trips which caused voltage and load imbalances. Generation changes on Cinergy's part and transmission loading relief from MISO helped to control flow. These specific faults did not contribute to the large outage later in the day on the 14th because it was handled well and by multiple parties.

Before the widespread outage, FirstEnergy noticed the need for extra voltage support. The reliability operator working at the time made calls to quite a few generation plants to request for support. This is an example of good, early communication, and if more communication like this had occurred, it is possible that the outage could have been avoided or reduced, especially if communication between parties had begun as early as this internal communication did.

Overall, there are not many specific parts of this day that were handled especially well; for the most part the events that transpired were unforeseen and therefore no party was adequately prepared to respond. As noted, some groups were communicating well and if they had not done so likely the outage would have been even worse, but it was not enough to stop the outage from occurring.

What Needs Improvement

The analysis found that firstly, the group known as FirstEnergy, an electric utility company in Akron, Ohio did not have comprehensive knowledge of their own system. For example, the company did not have studies of their system for the future, or studies for extreme conditions instead of regular conditions. Because of this, the system was not operated with correct voltage criteria. This means that the voltage criteria under which the system was operating did not match real life voltage criteria and needs.

Second, FirstEnergy's system had begun to deteriorate already at the time of the system failure. The transmission system was not analyzed frequently enough for this to be noticed until it was too late. FirstEnergy's TSOs did not know if their means of monitoring the system was even functional. From the report, it seems like overall the TSOs for FirstEnergy's transmission system did not have adequate support from the company to allow good communication and good use of tools as there was no standard procedure for use of these tools, maintenance of these tools, or updates of these tools.

Third, tree growth is a frequent cause of outages - it is understood that this cannot always be avoided. But, tree growth should not and normally does not cause extreme outages/conditions like they did for FirstEnergy during this event. Three 345kV transmission lines and one 138-kV line that were in FirstEnergy's ownership faulted due to tree growths.

Finally, interconnected parts of the grid did not share real-time data with each other, which caused decision making problems. For example, Midcontinent Independent System Operator (MISO) did not receive data from Dayton Power and Light's Stuart-Atlanta lines that were interconnected. This made it so MISO was unaware of FirstEnergy's issues, so they could not prepare for potential extreme conditions. Similarly

to the Europe blackout when E. On Netz had N-1 security violations due to calculations using old data, due to MISO not having up-to-date information caused N-1 security calculations to be done using bad data and causing N-1 security violations to go unnoticed in the FirstEnergy system.

The NERC found that seven reliability policies were violated, as well. They were:

- Inadequate monitoring equipment, violating NERC Policy 4, Section A, Requirement 5
- Inadequate use of state estimation and contingency analysis tools, violating NERC Policy 5, Section C, Requirement 3, and Policy 4, Section A, Requirement 5
- Failure to notify nearby reliability coordinators of issues, violating NERC Policy 9, Section C, Requirement 2
- Use of out-of-date data to make real-time calculations, violating NERC Policy 9, Appendix D, Section A, Criteria 5
- Lack of procedures/guidelines, violating Policy 9, Appendix C (however this policy is unclear in definition of adequate procedure/guideline)
- Failure to take restorative actions to return systems to safe operating states, violating NERC Policy 2, Section A, Standard 1
- Failure to communicate emergency conditions to surrounding system operators, violating NERC Policy 5, Section A

The culmination of this day was the fact that FirstEnergy's EMS (energy management system) experienced several IT related issues and was not only malfunctioning such that operators were no longer receiving alarms, but operators were not informed that the EMS system was experiencing outages so they did not know to manually check for system failures that would normally cause alarms. Overall it seems like on August 14th 2003, many system failures occurred in ways that most of the involved parties simply were not prepared to handle.