U.S. ELECTRICITY RELIABILITY
How Are We Measuring Performance?

IEEE Power and Energy Society
Working Group on Distribution Reliability

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LBNL Webinar
http://der.lbl.gov/eto_webinar.html

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Overview

- Assessing and improving electricity reliability depends on meaningful metrics to inform and guide utility management practices, regulatory oversight, and policy development.

- DOE’s Office of Electricity Delivery and Energy Reliability has tasked LBNL to review publicly available information on electricity reliability performance.

- LBNL’s work-in-progress reveals substantial variation in current practices and provides preliminary insights into its significance.
In 2004, LBNL Estimated That Power Interruptions Cost the Nation ~$79 B/yr

Yet, LBNL Also Found Significant Uncertainties in the Data

http://certs.lbl.gov/certs-rtina-pubs.html
DOE is Assessing Information on Reliability of the U.S. Electricity System

- Review publicly available information on utility reliability performance – the topic of today’s presentation

- Re-estimate customer damage functions based on a meta-analysis of a larger number of utility value of load studies – update the 2003 LBNL study

- Examine information on market trends in the sales of reliability (and power quality) enhancing equipment to electricity consumers – future work
Today’s Presentation: Preliminary Findings Drawn from Publicly Available Reliability Performance Information Collected by PUCs

• With assistance from the NARUC Electricity Reliability Staff Subcommittee, LBNL contacted state PUCs to obtain publicly available information on utility reliability performance

• The information we have collected to date offer preliminary insights into:
  • Evolving state requirements and practices (compared to NRRI’s 2004 survey)
  • Effect of variations in utility reporting practices (e.g., with respect to IEEE 1366-2003)
  • Relationship between utility reports and the DOE/OE Form 417 and NERC DAWG data
We’ve Obtained Electricity Reliability Performance Information for 123 Utilities from 37 State PUCs

- The 123 utilities represent nearly 80% of U.S. electricity sales by IOUs (or nearly 60% of total U.S. electricity sales)

- We find that 10 additional states (35 total) now require reporting or monitoring of reliability events compared to the number reported in the 2004 NRRI/NARUC survey

Legend:
- LBNL received data for >1 utility
- LBNL received data for only 1 utility
- No data received because not required to be submitted routinely
- No data received because considered confidential
- No regulated utilities
Simple Analyses of Reported Information Can Be Misleading

There are important differences among utility data reporting practices:

- Definition of sustained interruption
- Inclusion/exclusion of Major Event Days
- Definition of Major Event Days

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Utility Definitions for Sustained Interruption Vary in Duration

N=123

Number of utilities

<1 min | >1 min | >2 min | >5 min | >10 min
---|---|---|---|---
7 | 26 | 2 | 87 | 1
Inclusion/Exclusion of Major Event Days is an Important Factor in Assessing Reports

### SAIDI

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### SAIFI

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Definition of Major Event Day is an Equally Important Factor to Take Into Account

- Planned: 6
- Unplanned: 84
- Load: 12
- Customer: 85
- Duration: 63

IEEE 1366-2003
State PUC Requirements Drive Some, But Not All Utility Reporting Practices

Definition of Major Events – State Requirements

- IEEE 1366-2003: 4 states
- Other: 17 states
- No State Requirement: 15 states
- Not specified: 1 state
- Total: 37 states

Definition of Major Events – Utility Practices

- IEEE 1366-2003: 14 utilities
- Other: 109 utilities
- Total: 123 utilities
We Can Assess the Impact of IEEE 1366-2003 by Comparing SAIDI and SAIFI for Utilities that Use both Reporting Methods
Many Utilities Also Report Information On Each Major Event Day

- **Use IEEE 1366-2003**: 8 utilities
- **Do not use IEEE 1366-2003**: 47 utilities

**Total number of utilities (N)**: 55
We’ve Conducted an Initial Comparison of Utility Reports on Individual MEDs to Information Reported to DOE on Form 417

Of the 91 events reported in the 2006 Form 417 database, we were able to identify 24 with dates corresponding to major event days reported in our utility data.

However, 13 of these did not include info on number of customers affected.

Of the remaining 11, only 8 events were ones reported by the same utility for which we had data on major event days.
We’ve Also Compared Utility Reports on Individual MEDs to Information Reported to the NERC DAWG

Of the 52 events reported in the 2006 DAWG database, we were able to identify 16 with dates corresponding to major event days reported in our utility data. However, 2 of these did not include info on number of customers affected. Of the remaining 14, only 8 events were ones reported by the same utility for which we had data on major event days.
Preliminary Conclusions

• There is wide variation in information reported by utilities on their reliability performance
  • Some variation is due to real differences, some may be due only to differences in reporting practices and conventions
  • Meaningful comparisons among utilities are hampered by differences in reporting practices and conventions
• IEEE 1366-2003 offers one means for ensuring greater comparability among future reports
  • The IEEE Standard, per se, does not appear to bias results
  • Reporting of metrics, both w/ and w/o Major Event Days, as well as listing of each Major Event may address concerns regarding use of more standardized reporting
• More work is needed to better understand and reconcile differences between reporting at the regional-level to DOE and NERC and reporting at the local-level to PUCs