

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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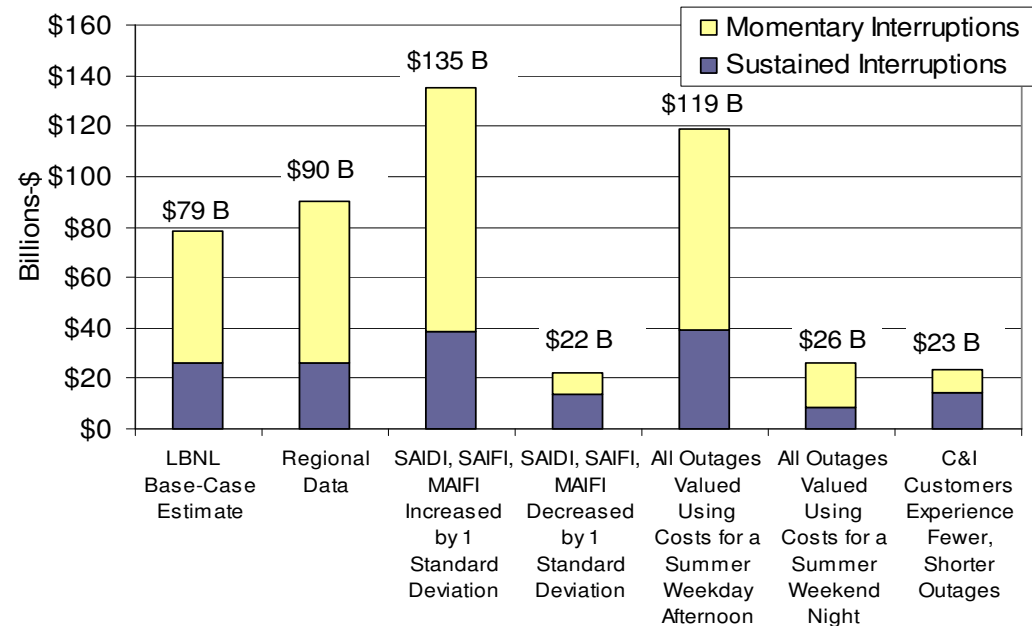
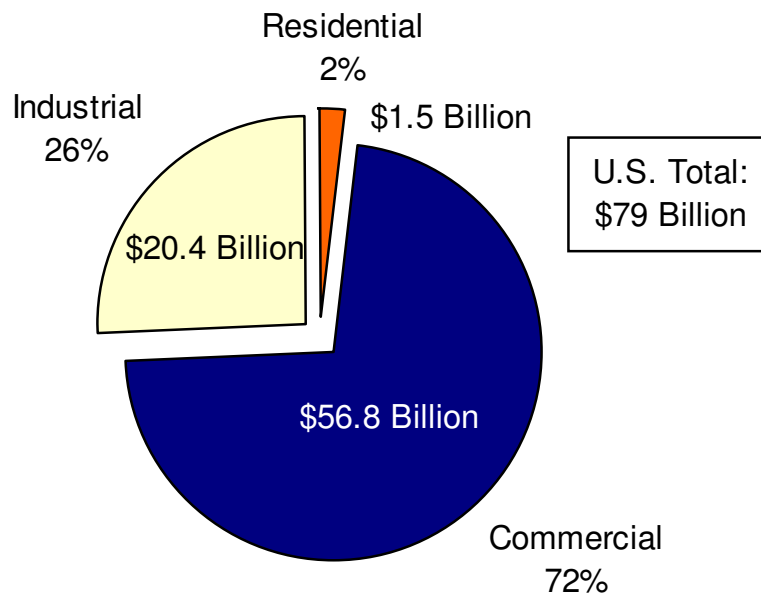
Overview

- **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



Source: Hamachi-LaCommare, K, and J. Eto. *Understanding the Cost of Power Interruptions to U.S. Electricity Customers*. July, 2004. LBNL-55718

<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 a meta-analysis of a larger number of utility value of loss 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*

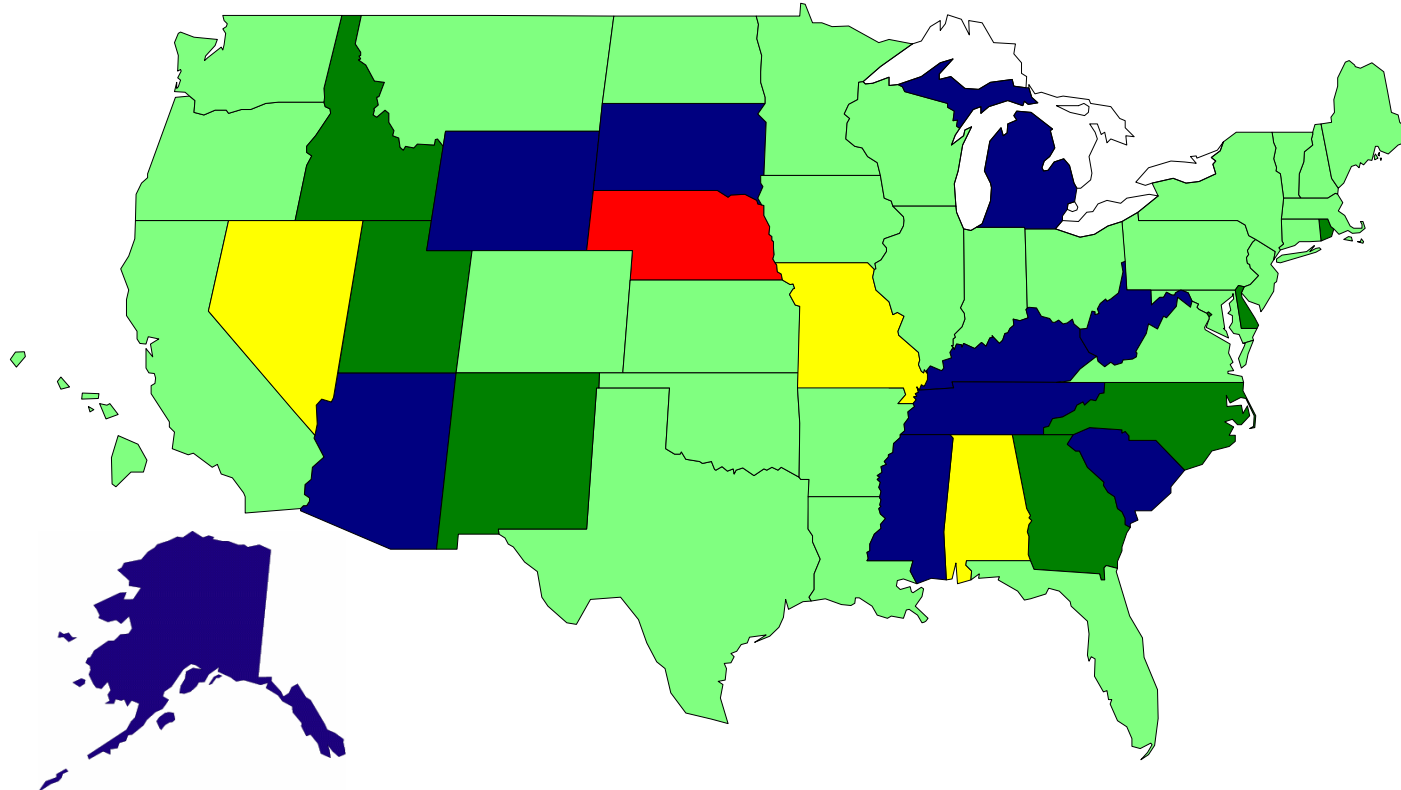


Today's Presentation: Preliminary Findings Drawn from *Publicly Available* Reliability Performance Information Collected by PUCs

- 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



- 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

- 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



Simple Analyses of Reported Information Can Be Misleading

	SAIDI
Average	150
Median	136
St. Dev.	86
N	123

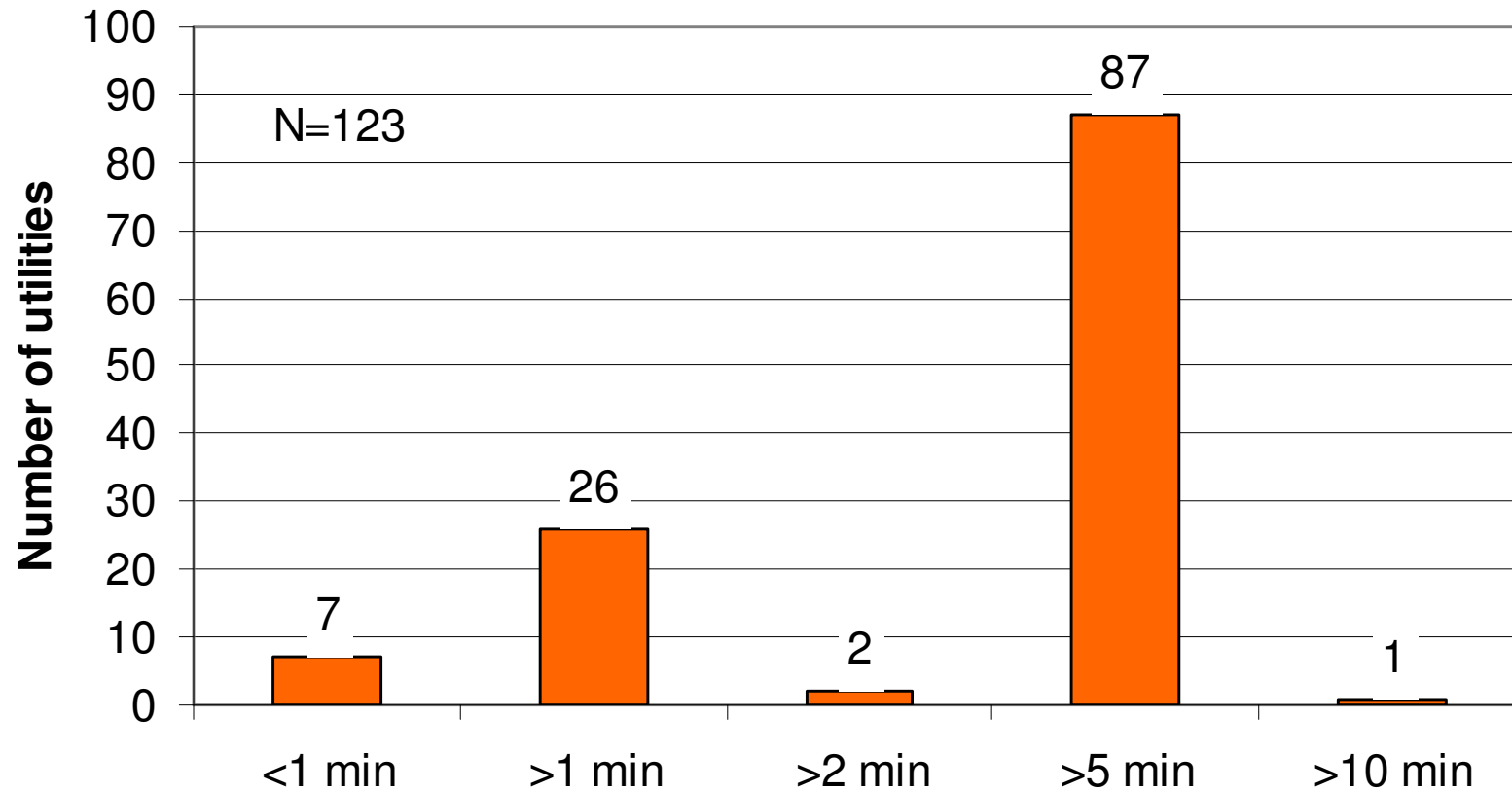
	SAIFI
Average	1.3
Median	1.3
St. Dev.	0.5
N	123

There are important differences among utility data reporting practices:

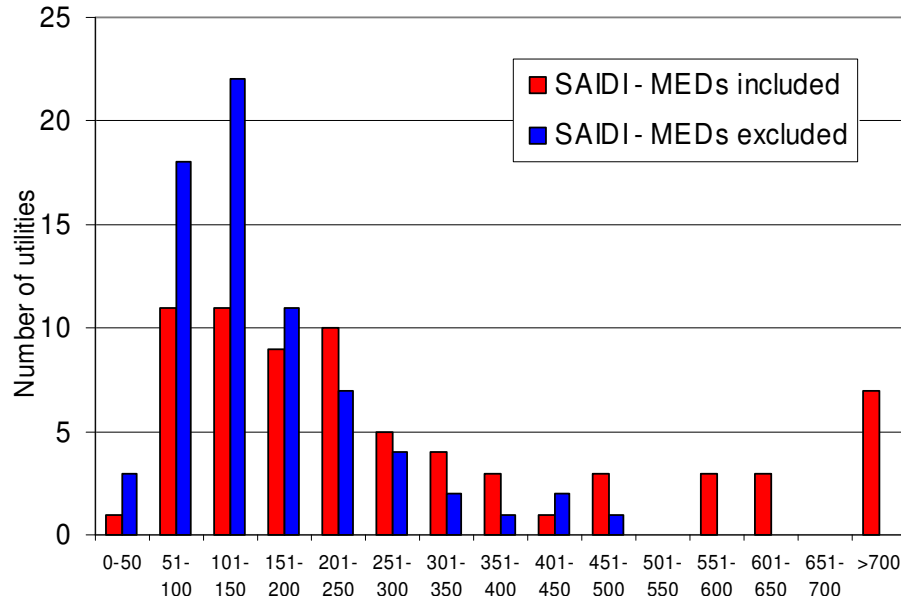
- Definition of sustained interruption
- Inclusion/exclusion of Major Event Days
- Definition of Major Event Days



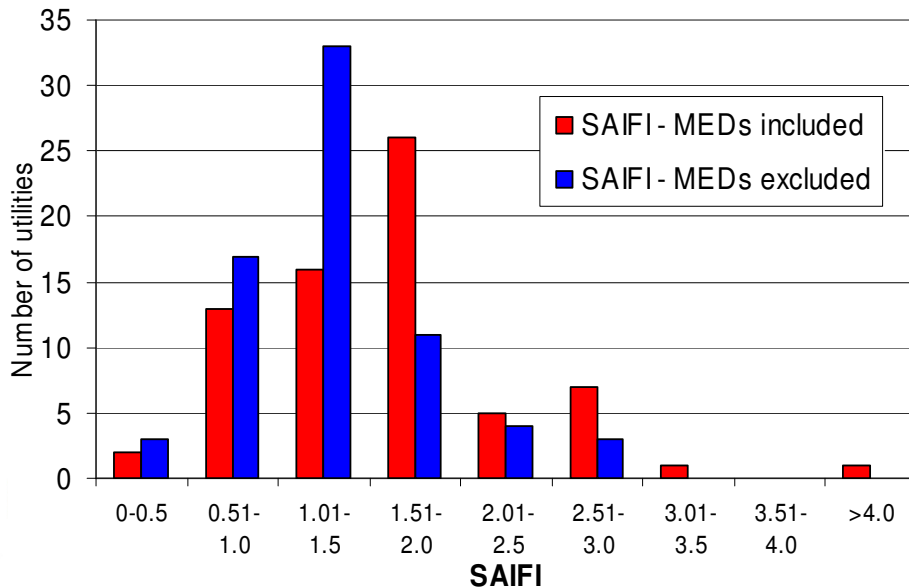
Utility Definitions for Sustained Interruption Vary in Duration



Inclusion/Exclusion of Major Event Days is an Important Factor in Assessing Reports



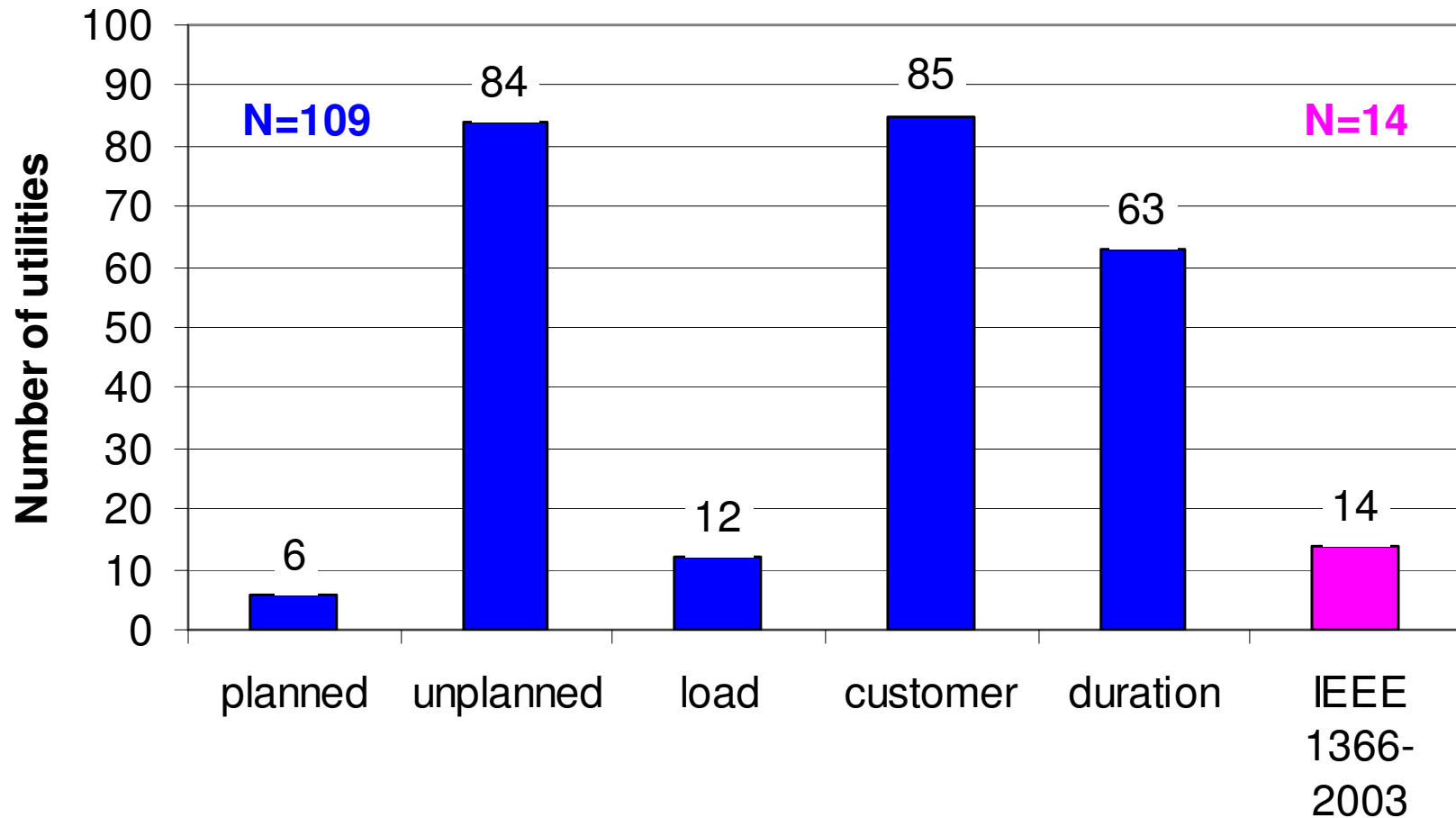
SAIDI	MEDs included	MEDs excluded	% Diff
Average	344	155	-55%
Median	213	130	-39%
St. Dev.	499	97	-81%
N	71	71	



SAIFI	MEDs included	MEDs excluded	% Diff
Average	1.6	1.3	-21%
Median	1.6	1.2	-24%
St. Dev.	0.7	0.5	-28%
N	71	71	

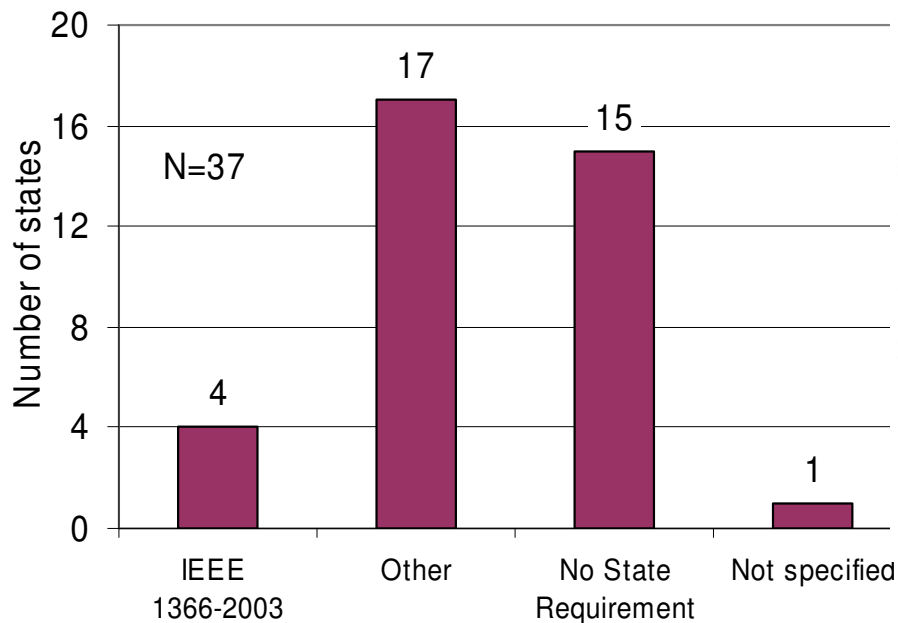


Definition of Major Event Day is an Equally Important Factor to Take Into Account

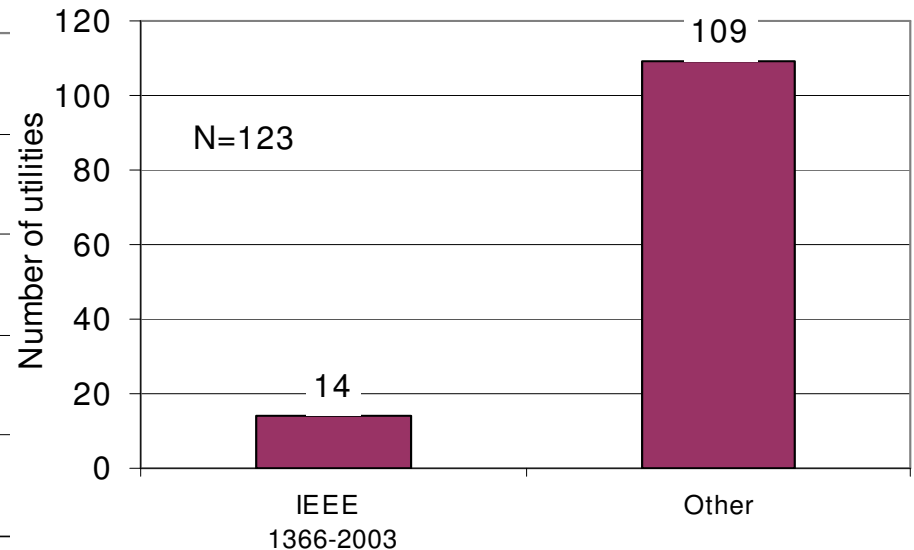


State PUC Requirements Drive Some, But Not All Utility Reporting Practices

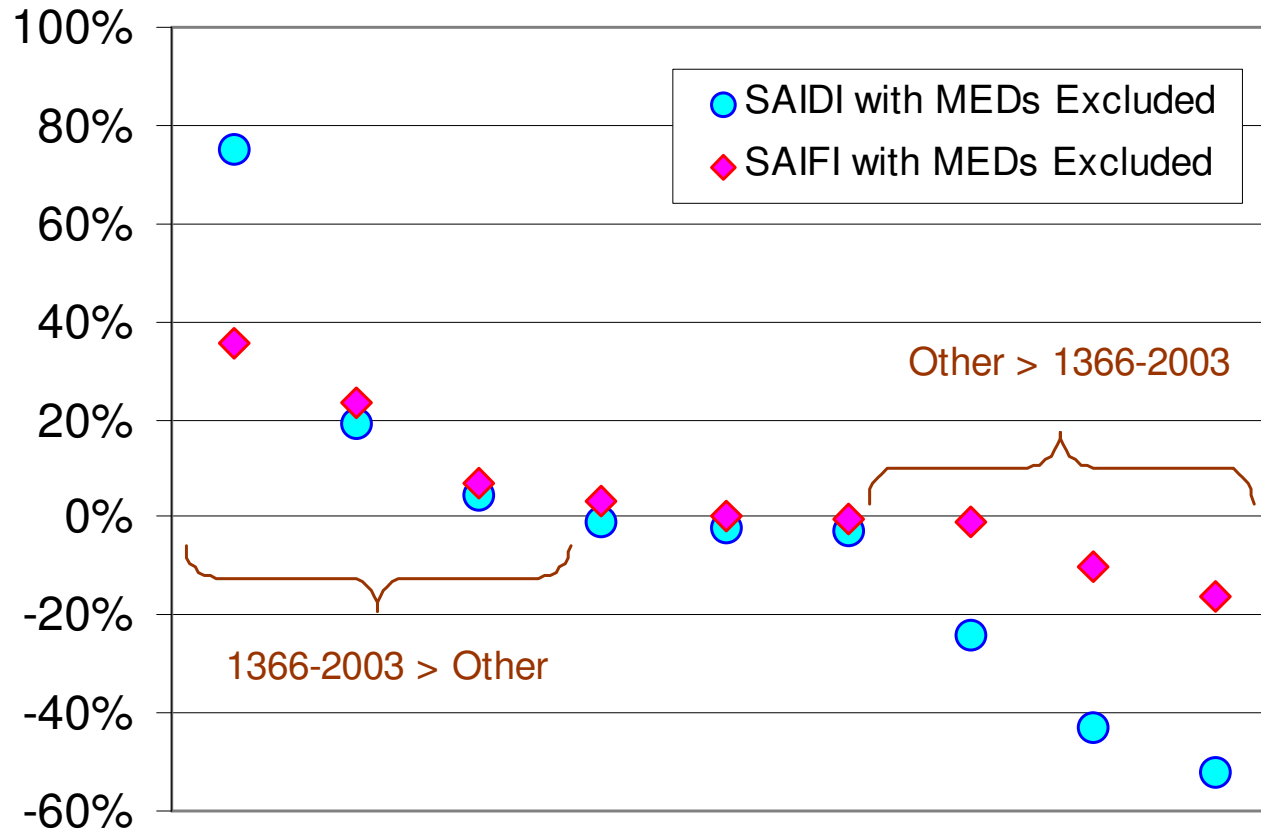
Definition of Major Events – State Requirements



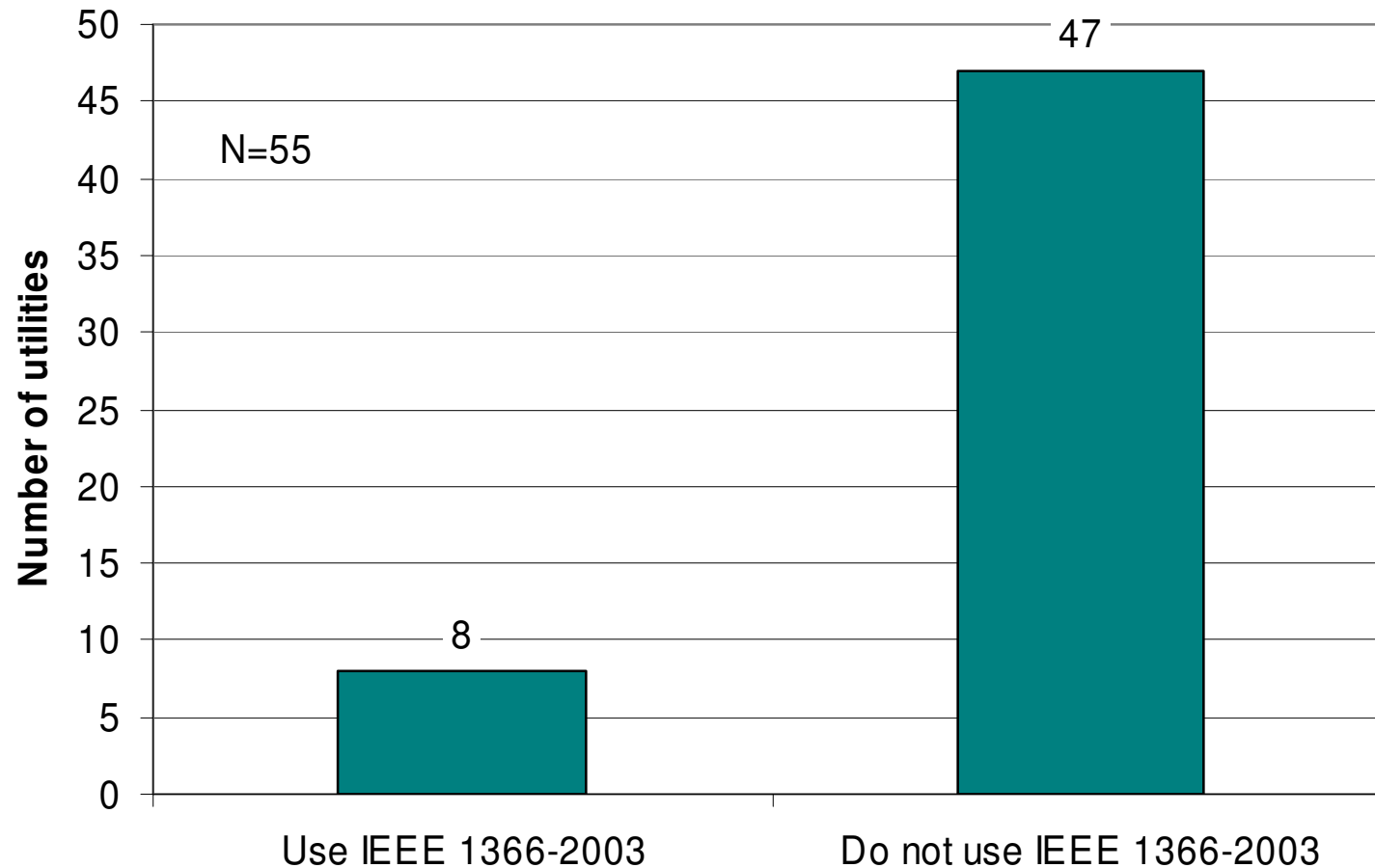
Definition of Major Events – Utility Practices



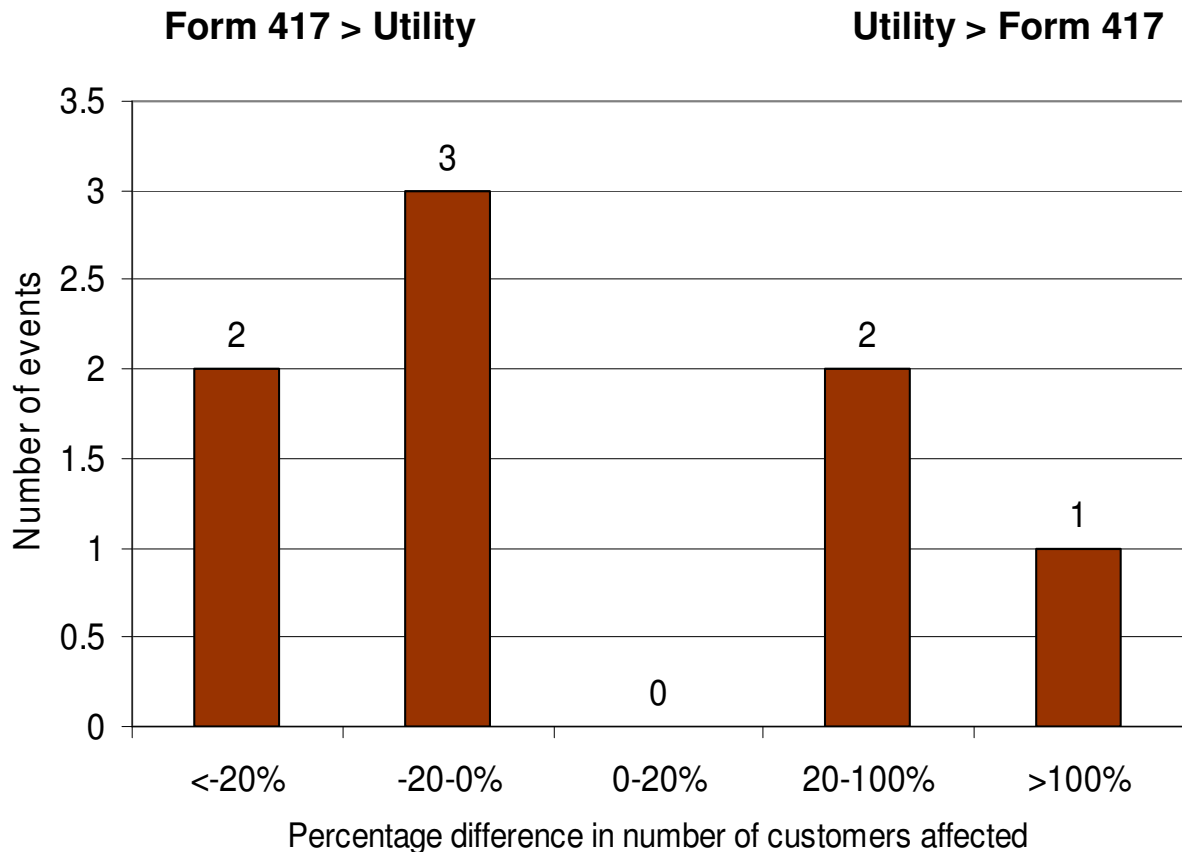
We Can Assess the Impact of IEEE 1366-2003 by Comparing SAIDI and SAIFI for Utilities that Use both Reporting Methods



Many Utilities Also Report Information On Each Major Event Day



We've Conducted an Initial Comparison of Utility Reports on Individual MEDs to Information Reported to DOE on Form 417



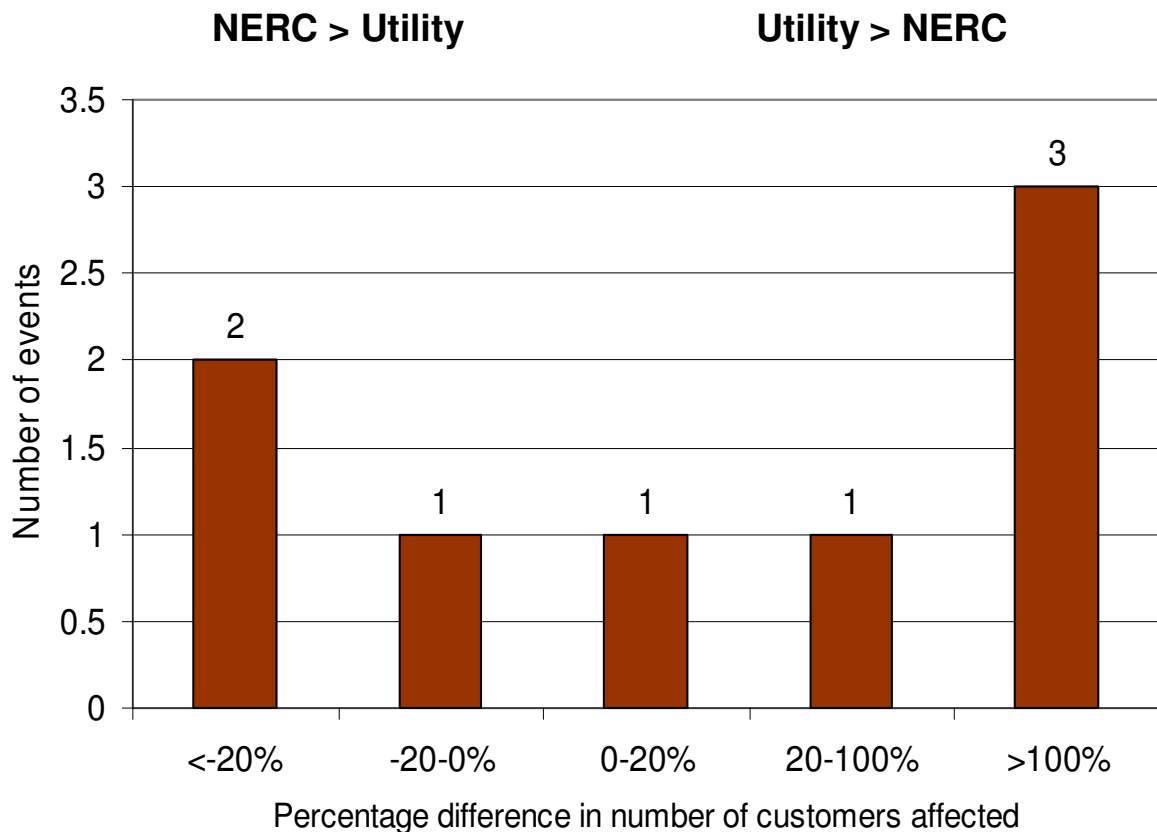
Of the **91** events reported in the 2006 Form 417 database, we were able to identify **24** with dates corresponding to major event days reported in our utility data

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**

