Electric Reliability Requirements

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PSC PUBLIC SERVICE COMMISSION OF KENTUCKY

NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS

SAFE AND ADEQUATE SERVICE ARE REQUIRED BY LAW

KRS 278.042(2): Authorizes PSC to enforce service adequacy and safety standards for electric utilities; specific requirements are set by PSC regulation and National Electrical Safety Code (Institute of Electrical and Electronics Engineers, Inc.)

PSC Regulations

807 KAR 5:041

General requirement applies to both the utility and its customers:

Operate in a way that prevents "undesirable effects" on the operations, service and equipment of the utility and its customers , as well as other utilities

PSC Regulations

- Metering required for generation station output and power purchases
- Voltage and frequency standards
  - Standard nominal voltage required
  - Voltage variation no more than +/- 10%
  - Utility may limit customer-caused voltage drops to 4% (or no light flicker)
  - Voltage surveys required
  - Frequency set at 60 Hz

PSC Regulations

Continuity of Service

- Utilities required to make “all reasonable effort to prevent interruptions of service”
- “Shortest possible delay” required in service restoration
- Planned outages

  - Timed for least disruption

  - Advance notification to affected customers

PSC Regulations

Continuity of Service

Significant unplanned outages must be reported to PSC:

- 500+ customers (or 10% of customers, whichever is smaller)
- Duration greater than 4 hours
- Must be reported within 2 hours
- Written report within 7 days

Evaluating and enforcing service reliability

Evaluating service reliability

- Uniform reporting standards in place only since 2007 (PSC case 2006-00494)
- Recent administrative proceeding (PSC case 2011-00450) revised reporting requirements

Current reliability indices

- System Average Interruption Duration Index (SAIDI)
- System Average Interruption Frequency Index (SAIFI)
- Customer Average Interruption Duration Index (CAIDI)

Current reliability indices

Reporting of indices based on criteria and definitions set by Institute of Electrical and Electronics Engineers (IEEE Standard)

Annual reliability report

- Due May 1 every year
- System-wide SAIDI, SAIFI and CAIDI
- All circuits tracked to identify those with below-average reliability
- Utilities required to report corrective actions or, if no action take, explain their reasons

Annual reliability report

- Multiple reporting periods allows identification of overall service quality trends
- Circuits with chronic reliability issues are identified

Limitations of reliability reporting

Circuits and utilities are not alike

- Setting/customer density: urban vs. rural
- Terrain: flat vs. mountainous
- Vegetation: type & density of trees
- Facilities: above-ground vs. buried

Limitations of reliability reporting

Circuits and utilities are not alike

- Outage causes will vary
- Restoration times will vary
- Therefore, outage frequency and duration will vary
- Indices will vary across circuits within a given utility
- Indices will vary across utilities

Due to the great variability in operating conditions for electric utilities, Kentucky has NOT set any minimum standards for reliability of electric service (either frequency or duration of outages)

Enforcing service reliability

- Kentucky law does not allow rate-based incentives or penalties (some states can require customer rebates if service standards are not met)
- General penalty provisions are financially insignificant ($2,500 per violation maximum)

Enforcing service reliability

Kentucky uses several mechanisms

- Management audits
- Commission orders in connection with rate proceedings
- Commission investigations, either on complaint or PSC initiated

Management audits in service reliability

Management audit statute (KRS 278.255) allows PSC to retain outside auditor/consultant at utility expense.

Reliability audits have focused on:

- Utility construction practices
- Utility maintenance practices
- Utility funding for reliability-related operations and maintenance

Management audits in service reliability

The management audit process:

- Commission orders audit, stating reasons for doing so
- Consultant is selected
- Consultant, PSC staff and utility meet to determine scope of audit
- Consultant conducts audit
- Audit report is issued; utility responds
- Audit findings and recommendations are basis for corrective action plan

Management audits in service reliability

Implementing corrective action plan:

- Plan includes deadlines
- Reporting/monitoring
- Funding for implementation may be included in subsequent rate cases

Service reliability as an issue in rate cases

Rate cases are an opportunity to address service reliability:

- Customers or intervening parties can raise reliability issues in the rate proceeding
- PSC can tie revenue increases to spending on reliability improvements

Major outages focus attention on electric reliability issues

Major outages

Kentucky has frequent severe weather that can produce both localized and widespread outages.

- Tornadoes – spring/summer
- Straight-line winds – spring/summer/fall
- Heavy snow or ice – late fall through early spring

Major outages

Scope of outages

- 1,000s of customers for less than 24 hours is fairly common – several times per year
- 10K-50K customers for several days – usually at least once per year
- Larger or longer outages are less frequent

Examples

Major outages

Record outages

Wind:

- **Sept. 2008**
- **600K customers**
- **Full restoration: 2 weeks**

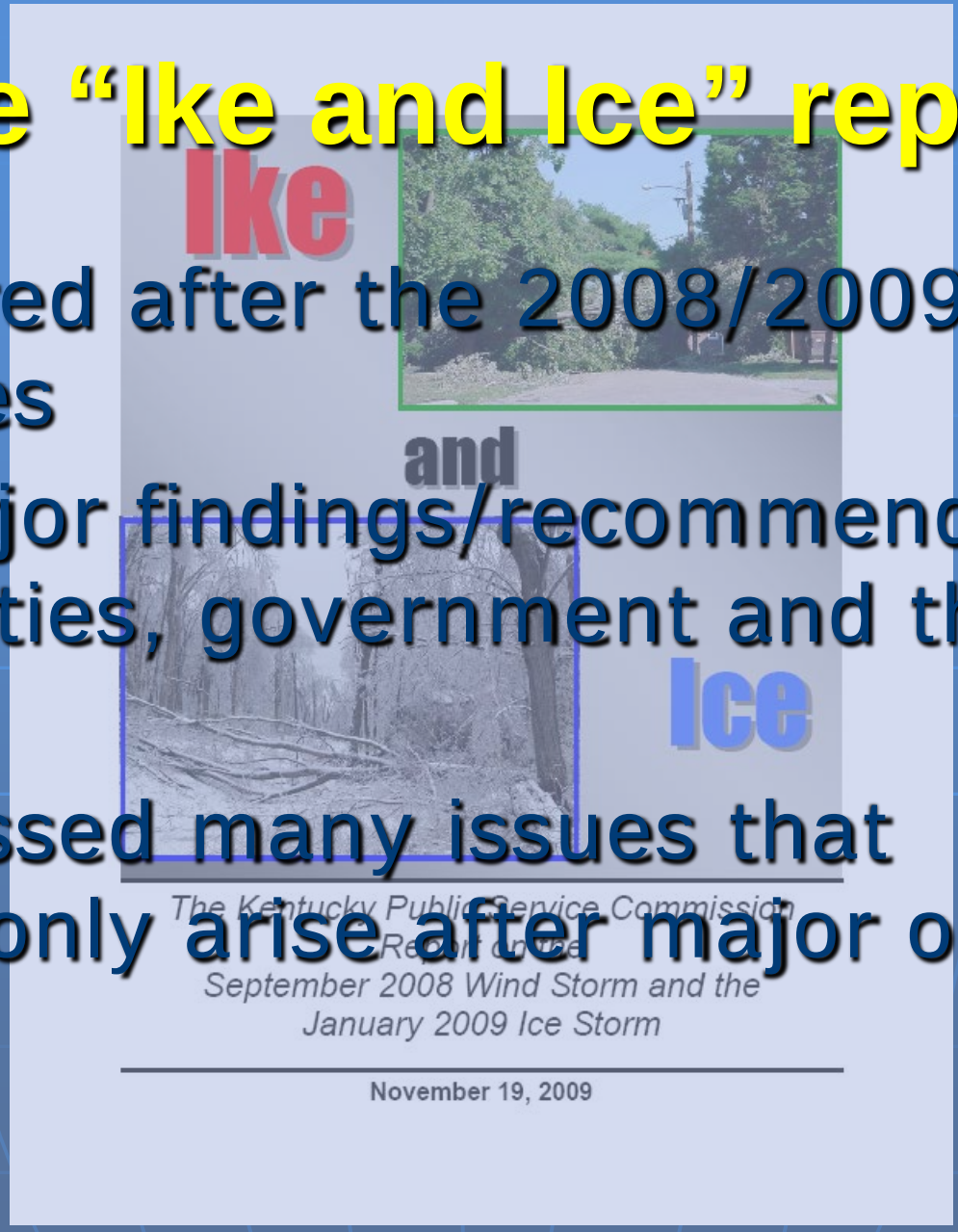
Record outages

Ice:

- **Jan. 2009**
- **770K customers**
- **Full restoration: 3 weeks**

The "Ike and Ice" report

- Prepared after the 2008/2009 record outages
- 64 major findings/recommendations to utilities, government and the public
- Addressed many issues that commonly arise after major outages



ADDING UP THE DAMAGE COSTS

	2008 wind storm	2009 ice storm	total
Damage to jurisdictional utilities	**$44.7 million**	**$240 million**	**$284.7 million**
Insurance payouts**	**$533 million**	**$335 million**	**$868 million**
Local government losses	**$17.3 million**	**$41 million**	**$58.3 million**
TOTAL	*$595 million*	*$616 million*	*$1.21 billion*

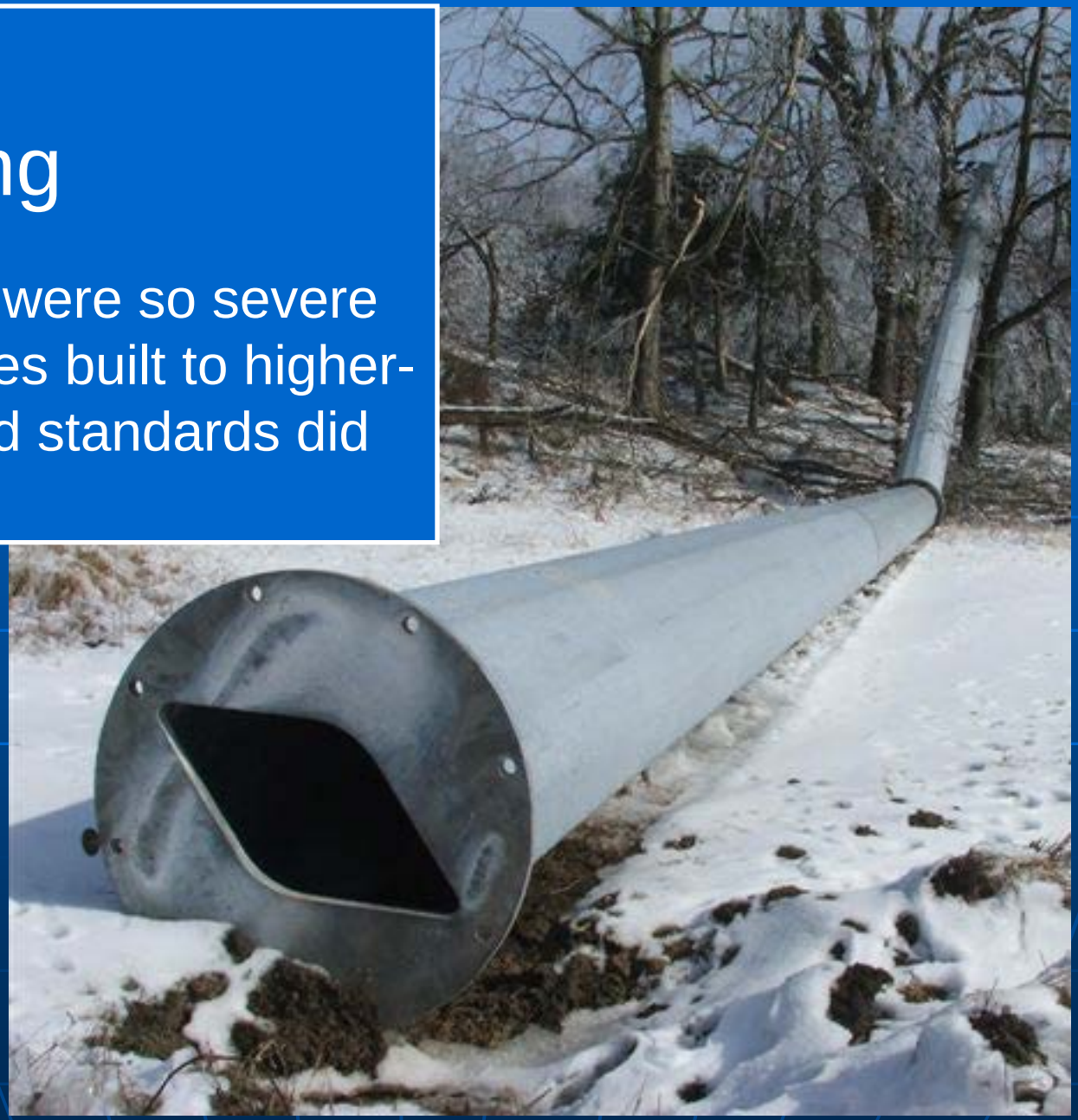
ALL FIGURES ARE ESTIMATES

Totals do NOT include non-jurisdictional electric providers (TVA system, municipals) or private property losses not covered by insurance or disaster assistance

***Less than $1.5 million to jurisdictional utilities*

System hardening

Both storms were so severe that even lines built to higher-than-required standards did not survive.



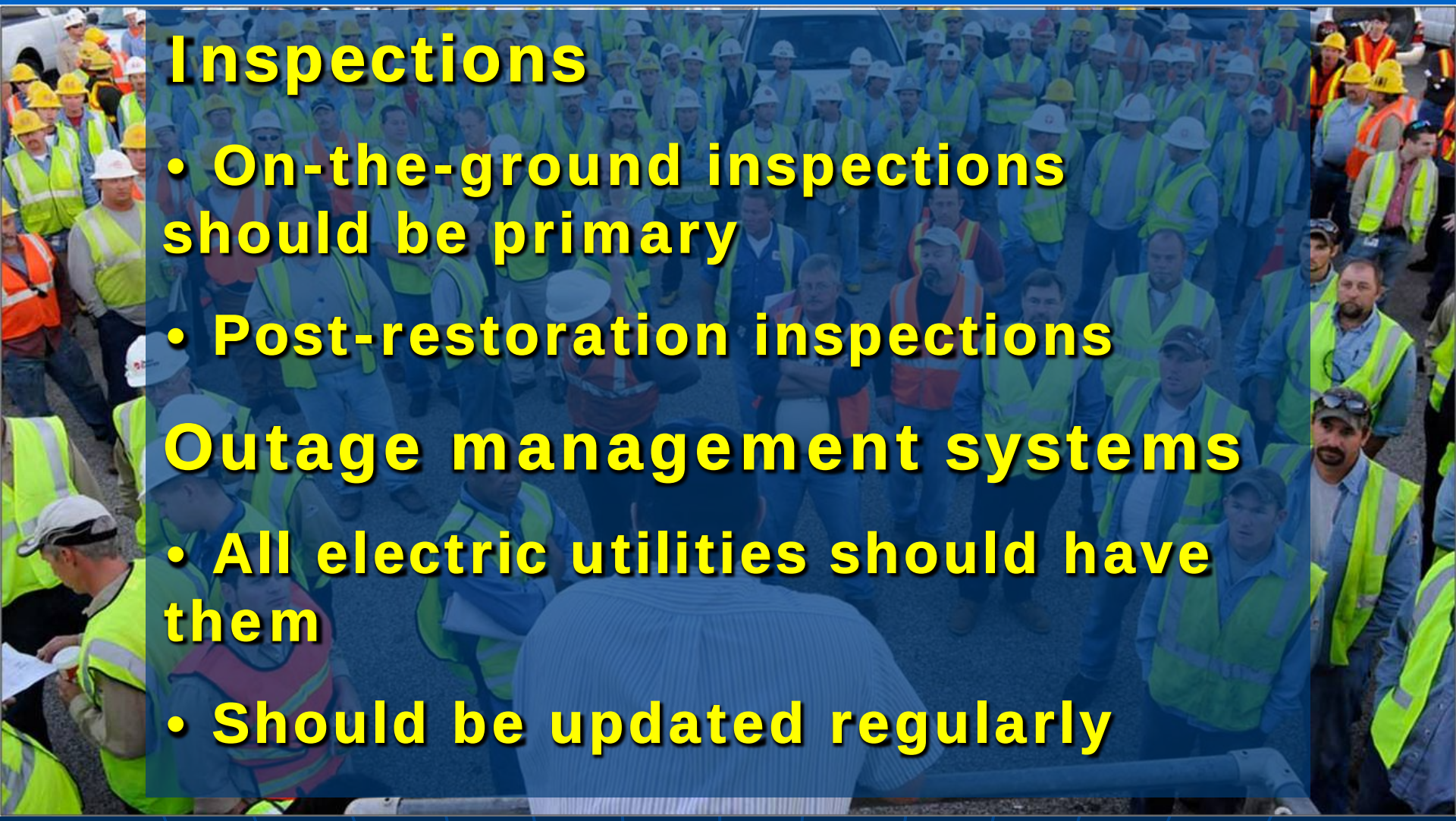
Underground conversion

Cost to put all of Kentucky's current electric infrastructure underground:

AT LEAST $217 BILLION

Converting all lines (either undergrounding or hardening) is neither economically nor technically feasible.

Undergrounding/hardening should be considered in certain circumstances



Inspections

- On-the-ground inspections should be primary
- Post-restoration inspections

Outage management systems

- All electric utilities should have them
- Should be updated regularly

Service quality in rate cases

Vegetation management

- Uniform standard is not practical in Kentucky
- Balancing act in urban/suburban areas between reliability and aesthetics
- Rural conditions vary widely in both topography and vegetation

Examples

Rate case:

Kentucky Power (2009-00459)

- Many customer complaints about poor reliability while case was under consideration
- Concurrent PSC investigation of reliability problems
- Settlement agreement set aside portion of revenue increase for reliability improvements
- Utility agreed to change vegetation management practices

Examples

Rate case:

Kentucky Power (2009-00459)

Before case: routine vegetation clearance only to first re-closer on circuit; otherwise as needed only

After case: entire circuit cleared on regular cycle

Service quality investigation – voltage support

Examples

Complaint case:

Meade County Rural Electric (2012-00310, 311, 312)

Filed by three residents who experienced problems after nearby rock quarry installed new equipment

PSC investigation included placement of monitoring equipment and inspections of facilities

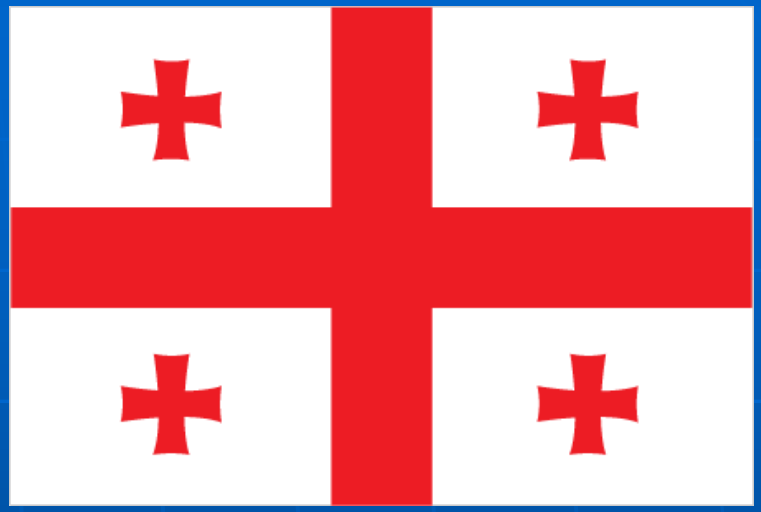
Examples

Complaint case:

Meade County Rural Electric (2012-00310, 311, 312)

Staff report filed – utility had opportunity to respond

Matter set for hearing in August



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THANK YOU

QUESTIONS?