

# Regulating Quality of Electric Service

Presentation to the Georgian National Energy  
and Water Supply Regulatory Commission

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# **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  $\pm 10\%$
  - 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 service reliability

- Uniform reporting standards in place only since 2007 (PSC case 2006-00494)
- New administrative proceeding (PSC case 2011-00450) underway to examine whether further revisions are needed

# 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 in March every year
- System-wide SAIDI, SAIFI and CAIDI for 5 preceding years
- List of 10 circuits with highest outage rates in past 5 years
- Major outage causes for each of the 10 worst circuits during the preceding year

# 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 two mechanisms

- Management audits
- Commission orders, particularly in connection with rate proceedings



# 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

# Examples

Management audit:

Kentucky Power Hazard-area audit  
2002/2003

- PSC ordered audit after persistent customer complaints
- Corrective action plan focused on specific area

# Examples

Rate case:

Kentucky Power (2009-00459)

- Many customer complaints 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

**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

# 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
<b><i>TOTAL</i></b>	<b><i>\$595 million</i></b>	<b><i>\$616 million</i></b>	<b><i>\$1.21 billion</i></b>

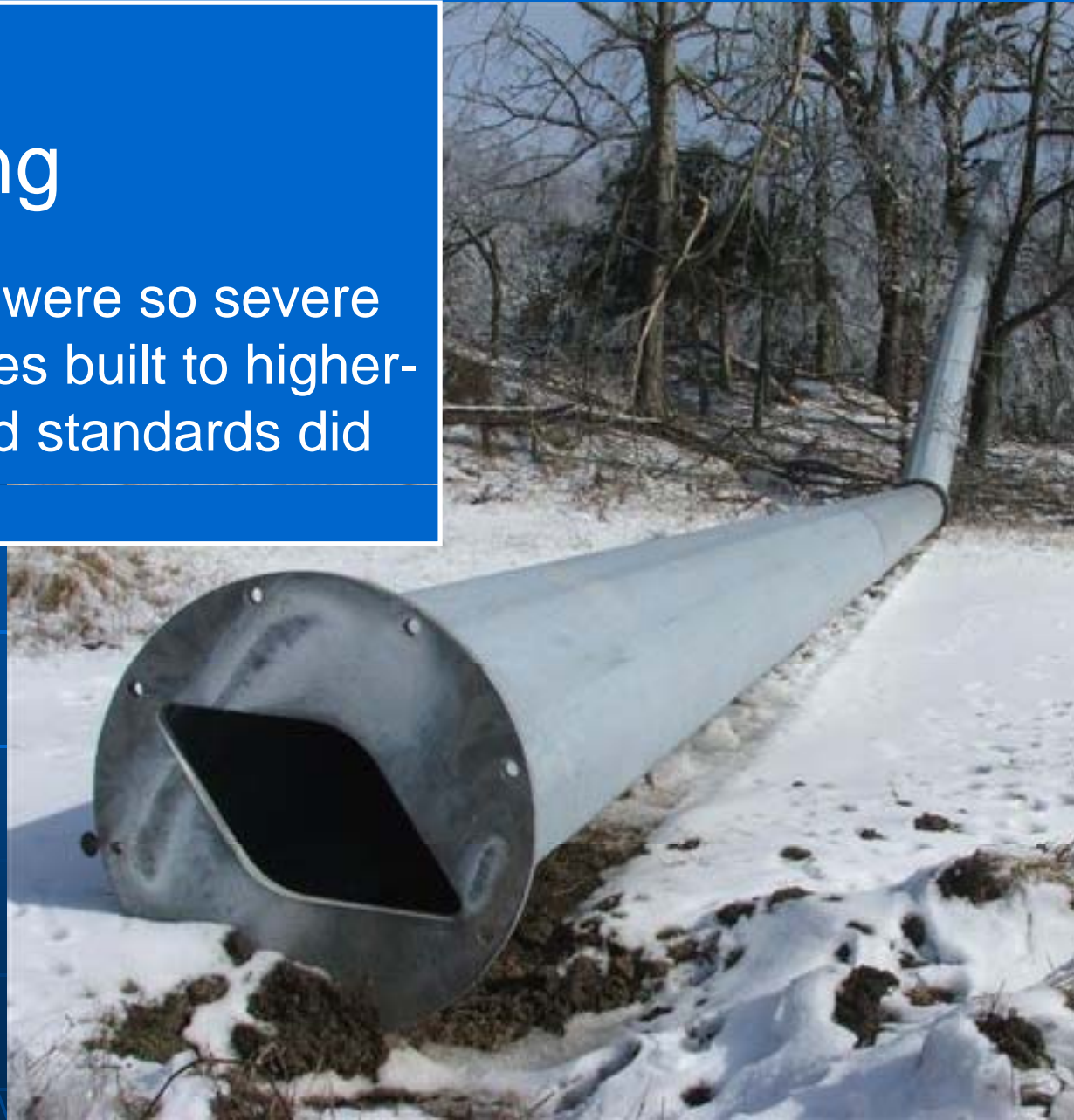
ALL FIGURES ARE ESTIMATES

*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**







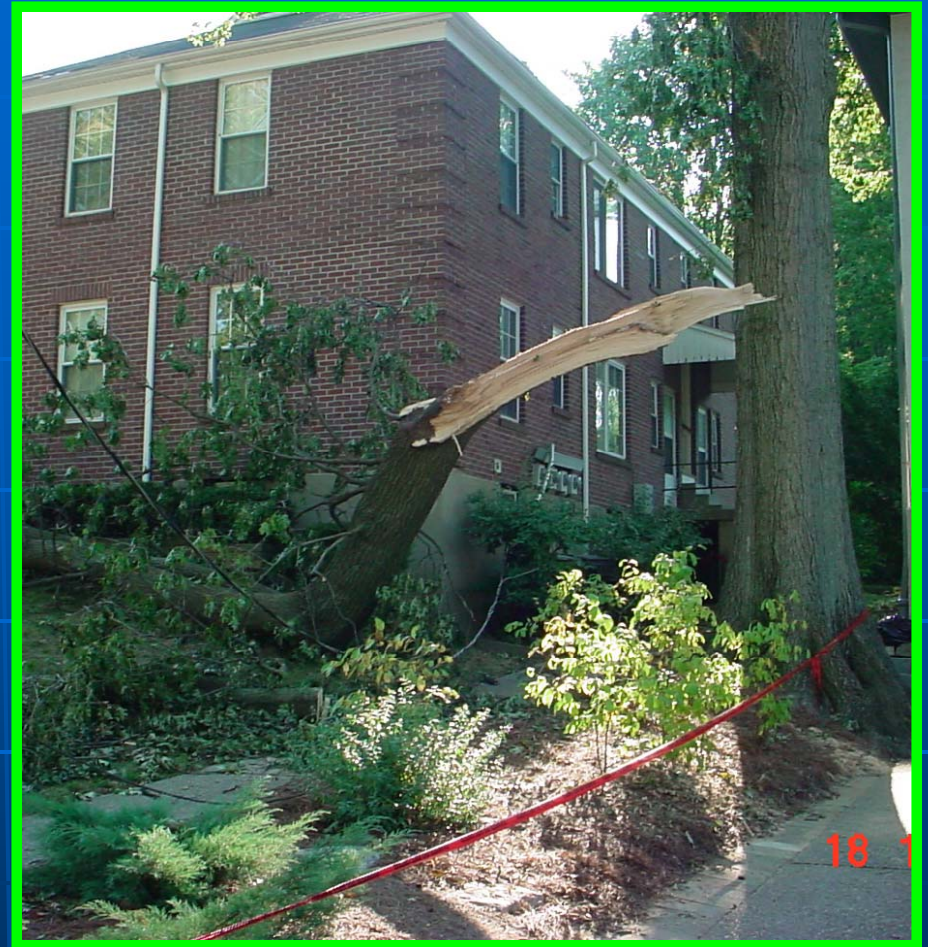
**Converting all lines (either undergrounding or hardening) is neither economically nor technically feasible.**



## Undergrounding/hardening should be considered in certain circumstances



Property  
service  
connections  
are a weak link  
in electric systems  
that could be  
helped by  
undergrounding  
or hardening





## Third-party pole attachments

Pole-owning utilities should not permit third-party pole attachments to compromise the ability of their systems to survive severe weather conditions



## Vegetation management

- Uniform standard is not practical in Kentucky due to widely varying conditions
- Balancing act in urban/suburban areas
- “Danger trees” need to be addressed







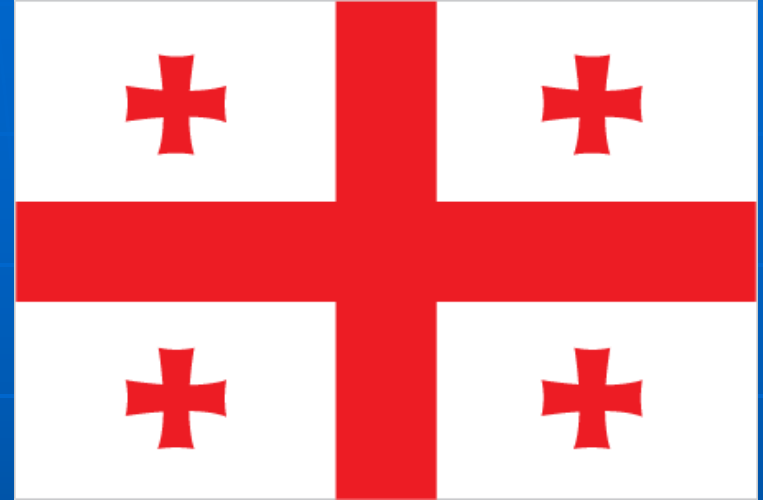
## **Inspections**

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

## **Outage management systems**

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





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THANK YOU

# QUESTIONS?