



PRC-006-NPCC-3

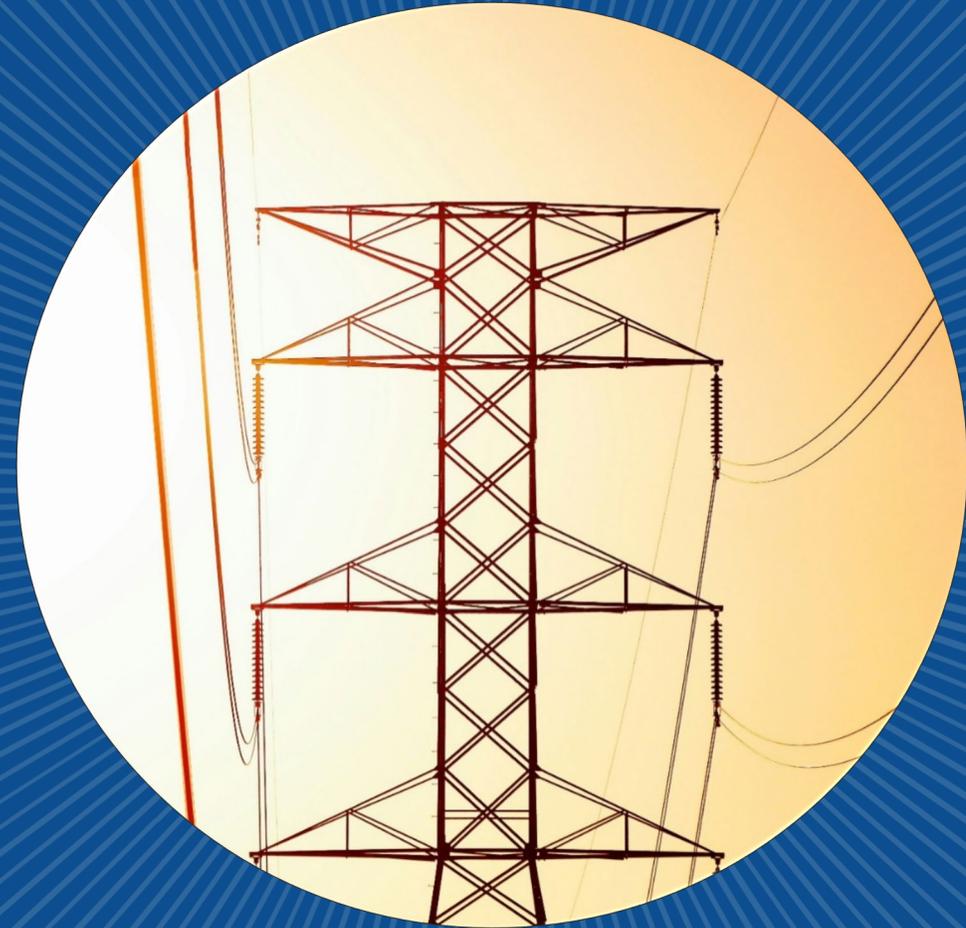
Automatic Underfrequency Load Shedding

John Babu – Manager, Protection & Controls Compliance, Standards & Support, Eversource

Ruida Shu – Manager, Reliability Standards & Criteria, NPCC

Michael Ridolfino – Senior Standards and Criteria Engineer, NPCC

Patrick Davis - Senior Standards and Criteria Engineer, NPCC



General Public Meeting Disclaimer

Participants are reminded that this meeting is public. Notice of the meeting was widely distributed. Participants should keep in mind that the audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders. Participants are also reminded to use discretion and take care not to disclose confidential information.



NPCC Outreach, Training, Events Disclaimer

Northeast Power Coordinating Council, Inc. (NPCC) is committed to providing outreach, training, and nonbinding guidance to industry stakeholders on important industry topics. Subject Matter Experts (SMEs) from NPCC's organizational groups and the industry may develop materials, including presentations, provided as part of the event. The views expressed in the event materials are those of the SMEs and do not necessarily express the opinions and views of NPCC.



Antitrust Compliance Guidelines

Because this event brings together market participants who may be viewed as actual or potential competitors, we must be mindful to conduct it in a manner that is consistent with the antitrust and competition laws. Participants should not disclose non-public, proprietary, or competitively sensitive information.

Attendees should exercise independent judgment and avoid even the appearance of discussions of agreements or concerted actions that may be viewed as restraining competition. Any company decisions that are informed by your discussions today must be made independently.

This guidance is not intended as legal advice, and each attendee is responsible for seeking their own legal advice with respect compliance with applicable antitrust and competition laws. However, any questions on NPCC's Antitrust Policy may be directed to NPCC's General Counsel.



Webinar Housekeeping



Recording: This webinar is being recorded. A link to the recording will be shared with all registrants after the session, so you can revisit the content or share it with colleagues.



Audio: All participants are muted by default to minimize background noise. If you experience any audio issues, try refreshing your browser or checking your device settings.



Q&A: We encourage your questions! Please use the Q&A box at the top of your screen to submit questions at any time. We'll address as many as we can during the Q&A portion at the end.



PRC-006-NPCC-3

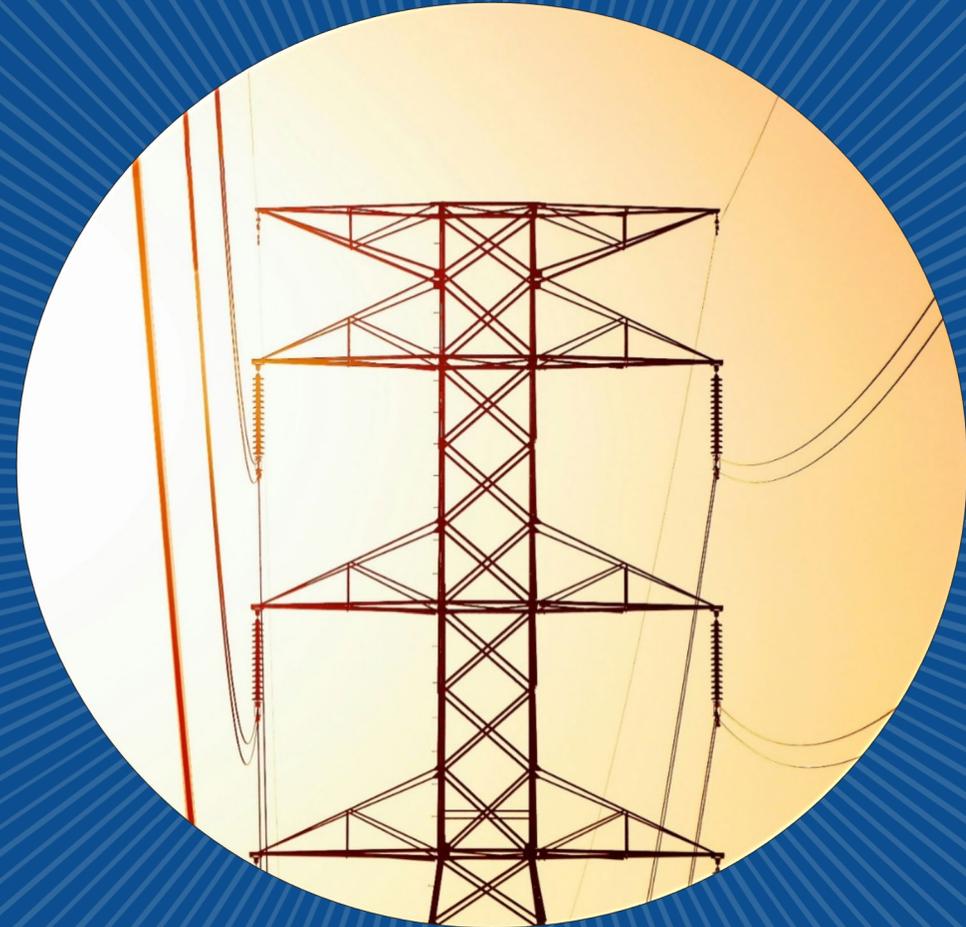
Automatic Underfrequency Load Shedding

John Babu – Manager, Protection & Controls Compliance, Standards & Support, Eversource

Ruida Shu – Manager, Reliability Standards & Criteria, NPCC

Michael Ridolfino – Senior Standards and Criteria Engineer, NPCC

Patrick Davis - Senior Standards and Criteria Engineer, NPCC



Agenda

- Administrative Items
- Background
- Project Status
- Proposed Changes
 - R3 – Attachment C, Tables 1 through 3
 - R10 – Protective Functions
- Implementation Plan
- Summary of Comments Received
- Questions



Background



Created with Azure OpenAI ImageGen

- PRC-006-NPCC-2 omitted long standing ± 50 ms UFLS operating time tolerance
 - Without explicit tolerances, UFLS stage times viewed as strict design criteria
- Overly rigid performance ranges hinder UFLS implementation
- Changes align real-world performance with planning assumptions:
 - Updated time tolerances
 - Adjusted load-shed requirements
 - Redefines breaker interrupting time

Project Status

Activity to Date

First Comment
Posting
4/14 to
5/29/2025

Final Comment
Posting
10/15 to
12/01/2025

Pre-ballot/
Ballot Period



Proposed Changes

- Requirement 3 – Attachment C, Tables 1 – 3
 - Remove upper limit to the cumulative requirements
- Upper bound of Stage 5 aligned with the sum of individual stage bounds at 33% (prev. 31.5%)
- Additional flexibility of 1.5% over the 5 stages
 - Alleviates inequitable / impractical restriction on entities with ≥ 100 MW load
- Prioritizes meeting minimum UFLS load-shed to ensure frequency recovery

UFLS Table 1: Eastern Interconnection					
Distribution Providers and Transmission Owners with 100 MW ² or more of peak net Load shall implement a UFLS program with the following attributes:					
UFLS Stage	Frequency Threshold (Hz)	Minimum Relay Time Delay (s)	Total Nominal Operating Time (s) ¹	Load Shed at Stage as % of TO or DP Load	Minimum Cumulative Load Shed as % of TO or DP Load
1	59.5	0.10	0.30	6.5 – 7.5	6.5 – 7.5
2	59.3	0.10	0.30	6.5 – 7.5	13.5 – 14.5
3	59.1	0.10	0.30	6.5 – 7.5	20.5 – 21.5
4	58.9	0.10	0.30	6.5 – 7.5	27.5 – 28.5
5	59.5	0.10	10.0	2 - 3	29.5 – 31.5

UFLS Table 2: Eastern Interconnection					
Distribution Providers and Transmission Owners with 50 MW ² or more and less than 100 MW ² of peak net Load shall implement a UFLS program with the following attributes:					
UFLS Stage	Frequency Threshold (Hz)	Minimum Relay Time Delay (s)	Total Nominal Operating Time (s) ¹	Load Shed at Stage as % of TO or DP Load	Minimum Cumulative Load Shed as % of TO or DP Load
1	59.5	0.10	0.30	14 – 25	14 – 25
2	59.1	0.10	0.30	14 – 25	28 – 50

UFLS Table 3: Eastern Interconnection					
Distribution Providers and Transmission Owners with 25 MW ² or more and less than 50 MW ² of peak net Load shall implement a UFLS program with the following attributes:					
UFLS Stage	Frequency Threshold (Hz)	Minimum Relay Time Delay (s)	Total Nominal Operating Time (s) ¹	Load Shed at Stage as % of TO or DP Load	Minimum Cumulative Load Shed as % of TO or DP Load
1	59.5	0.10	0.30	28 – 50	28 – 50



Proposed Changes

1. The total nominal operating time includes the underfrequency relay operating time plus any interposing auxiliary relay operating times, communication times, and the rated breaker interrupting time (measure or rated), with maximum deviation for any load limited to ± 50 ms for each UFLS Stage 1 to UFLS Stage 4, and ± 350 ms for UFLS Stage 5. For the study purposes, the total nominal operating times are used to simulate load interruption for the entire Balancing Authority Area UFLS program and assume the sum of all individual load deviations will have minimal net impact. The underfrequency relay operating time is measured from the time when frequency passes through the frequency threshold setpoint, using a test rate of frequency decay of 0.2 Hz per second. If the relay operating time is dependent on the rate of frequency decay, the underfrequency relay operating time and any subsequent testing of the UFLS relays shall utilize a test rate of linear frequency decay of 0.2 Hz per second.

- Requirement 3 – Attachment C, Tables 1-3
 - Revise Footnote #1 establishes:
 - ± 50 ms Tolerance for Stages 1-4
 - ± 350 ms Tolerance for Stage 5
- Rationale:
 - Restores the ± 50 ms tolerance from Directory 12
 - Stage 5 uses ± 350 ms
 - Frequency-dependent relay timing makes a tight band unrealistic for the 10-second anti-stall stage
 - Studies show valid results from ~9.65–10.35 seconds, making ± 350 ms a practical, technically sound limit



Proposed Changes

R10. Each Generator Owner shall set each generator underfrequency trip relay, protections (either provided by relays or protective functions), if so equipped, on or below the appropriate generator underfrequency trip protection setting threshold curve in Figure 2, except as otherwise exempted in Requirements R13 and R16. *[Violation Risk Factor: High] [Time Horizon: Long Term Planning]*

- Requirement 10
 - Ensures all protection settings are set consistent with UFLS requirements, irrespective of device types
 - Trip protections language aligned in Requirements 13 & 16



Implementation Plan

Requirement 10

- Enforceable on the first day of the first calendar quarter 12 months following applicable governmental and regulatory approvals
- Additional time given to facilitate changes to protective functions

All Other Requirements

- Enforceable on the first day of the first calendar quarter 3 months following applicable governmental and regulatory approvals
- No changes to physical equipment required to comply



Summary of Comments Received



Clarification

- Wording fixes identified and remedied
- Figure and table details corrections
- Rationale statements and defined term usage clarified and made consistent

Technical Issues

- Concern expressed in the removal of the upper limit
- Clarity sought on compensatory load shed and net-load calculations
- Justification sought for expanding protective function language

Scope & Future Needs

- Broader changes desired to address emerging risks (IBR and DER)
- Applicability to specific entity types
- Concern expressed regarding forthcoming regulatory shifts





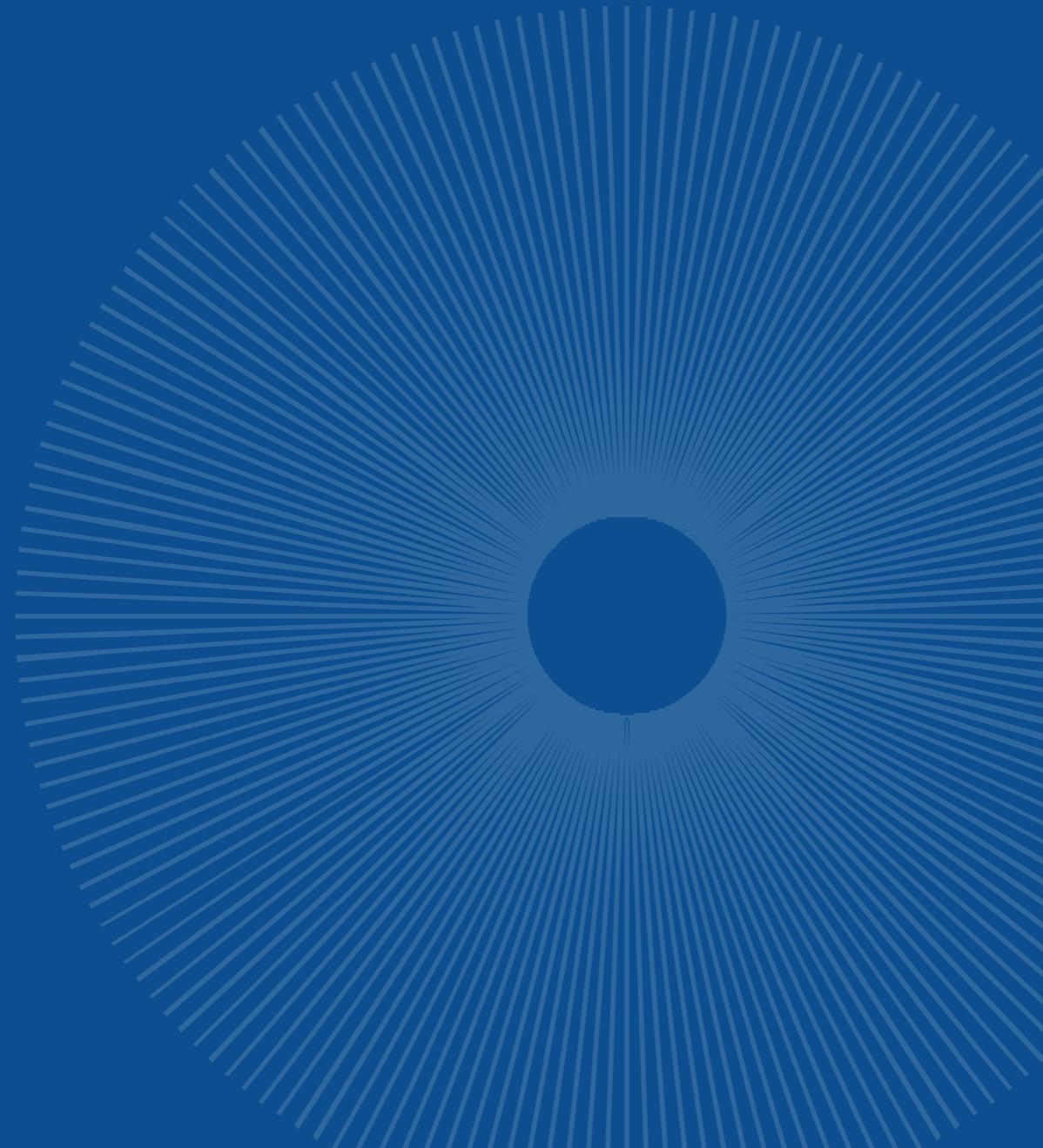
Questions?

Contact Us: npcc.org/contact

NPCC Standards & Criteria

PRC-006-NPCC-3 Webinar | Public

February 24, 2026



Upcoming NPCC Events

FERC Lessons Learned Report (LLR) Overview Webinar

- March 10, 2026
- 11:00 AM – 12:00 PM (EDT)
- [Register](#)

Upcoming Standards Webinar

- March 24, 2026
- 10:00 AM – 11:00 AM (EDT)
- [Register](#)

