Harmonizing Large Load Interconnection Requirements in the West

Large Load Industry Advisory Group

Meeting #6

October 22, 2026

WIRAB
Western Interconnection
Regional Advisory Body

Meeting Logistics



Recording

This meeting is being recorded and **may be posted publicly**. By participating, you consent to your name, voice, and image being part of the recording.



How to Participate

Use the **"Raise Hand"** feature to ask questions or provide input

Feel free to use the **chat** and make sure to send your chat to **Everyone**

We will be using **Slido** later in the meeting to solicit feedback



Audio Etiquette

Everyone came into the meeting muted

Please **mute yourself** when not speaking

If joining by phone, please identify yourself in the chat



Materials & Follow-Up

Slides and materials will be shared after the meeting and available on the webpage

Contact information will be provided at the end for follow-up questions or comments

Outline

Introductions and Background	Overview of WIRAB's role and motivation for this effort Explanation of the Industry Advisory Group's role
Large Load FIR Template Draft 1	Review Proposed Structure Discuss on Technical Requirements
Interactive Discussion and Q&A	Open Discussion and Slido Polls
Closing and Next Steps	Preview of next meeting and schedule

WIRAB's 2026 Strategic Initiatives

Long-term Planning Data and Models

Initiative 1: Advise WECC to work with states, provinces, and planning entities to improve long-term planning assumptions, data, and models to meet evolving regulatory and reliability needs.

Large-load Performance Requirements

Initiative 2: Advise WECC, NERC, and stakeholders to develop common interconnection and performance requirements for large loads—especially data centers—to ensure reliable and secure integration into the Bulk Power System.

Resource Adequacy with Electrification and Large Loads

Initiative 3: Advise WECC to study the impacts of rapid electrification and large load growth on reliability, including regional and seasonal resource adequacy trends.

Energy Storage Reliability Standards

Initiative 4: Advise WECC and the ERO to assess whether reliability standards adequately reflect the growing role of energy storage technologies in supporting grid stability and essential reliability services

Large Load Industry Advisory Group Meeting Schedule

Date	Topics
✅ May 28, 2026 (11:00 a.m.–12:00 p.m. MT)	Kickoff: Background, Goals, and Timeline
✅ June 25, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Review
✅ July 16, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Template Section #1
✅ August 13, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Template Section #2
✅ September 24, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Template Section #3
October 22, 2026 (11:00 a.m.–12:00 p.m. MT)	Template Review and Finalizing
November 12, 2026 (11:00 a.m.–12:00 p.m. MT)	Template Finalizing and Next Steps
December 3, 2026 (11:00 a.m.–12:00 p.m. MT)	Industry and Public Webinar

Industry Advisory Group Participation

Introductions:
- **Name**
- **Organization**
- **Role**
- **What are you dressing up for Halloween?**

September 2026 Registration Snapshot: Registered Participants: 171; Organizations Represented: 132

Category	Registrants
Utilities & Power Providers	78
Government & Regulators	24
Reliability & Market Organizations	12
Developers, Large Loads & Technology	25
Engineering, Consulting & Legal	15
Research & Trade Associations	12
Other / Unclassified	5

Participant Engagement

53 Active Participants
- Interested in contributing directly to development of the Large Load Interconnection Requirements Template

118 Monitoring Participants
- Interested in receiving updates and reviewing project outputs

Thank You!

Next Industry Advisory Group Meeting

November 12, 2026 at 11:00 AM MT

Marissa Moers

mmoers@westernenergyboard.org

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Large Load Interconnection Requirements Review

Industry Advisory Group (IAG) Meeting

Ryan D. Quint, PhD, PE, *President and CEO*
Kyle Thomas, PE, *COO / VP Engineering and Compliance Services*
Jiecheng "Jeff" Zhao, PhD, PE, *Manager, Engineering*

September 24, 2026

Disclaimers

- These views reflect the insights of Elevate Energy Consulting and do not necessarily reflect the views of Elevate's industry partners and clients.
- These views reflect learnings from working on multiple projects and all results have been genericized and anonymized to ensure confidentiality.
- These views are solely for informational purposes, discussion, and *elevating* industry understanding of practical and pragmatic issues.

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This Meeting Overview

- Review near-complete final draft template interconnection requirements document:
  - Walk through document
  - Gather any additional feedback
  - Discuss timing and plans moving forward
- Quick update on relevant NERC CLO efforts
  - Registration overview
  - Standards review
  - Timelines
- Open group discussion

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Jump to Word Doc

Slido Poll



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NERC Computational Load Registration and Standards

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NERC Computational Load Definitions & Registration Criteria

New NERC Definitions/Criteria (proposed)

Appendix 2 (Definitions Used in the Rules of Procedure)

Appendix 2 to the NERC Rules of Procedure includes defined terms used throughout the Rules of Procedure. The proposed revisions add the following three terms:

- "Computational Load Operator" means the entity that operates a Computational Load Site.
- "Computational Load Owner" means the entity that owns and maintains a Computational Load Site.
- "Computational Load Site" means one or more buildings, structures, or installations at a single location that
  1) Primarily contains information technology infrastructure used for:
     - creating, executing, and delivering software applications and services;
     - artificial intelligence training, deployment, and delivery;
     - cryptocurrency mining; or
     - other computational activities at a data center; and
  2) is supplied through electrical equipment that is connected to the BPS.

- Computational Load Owner or Operator of a Computational Load Site with a total connected Load greater than or equal to 50 MW that is supplied through electrical equipment connected at a voltage level greater than or equal to 100 kV from one or more points of connection.

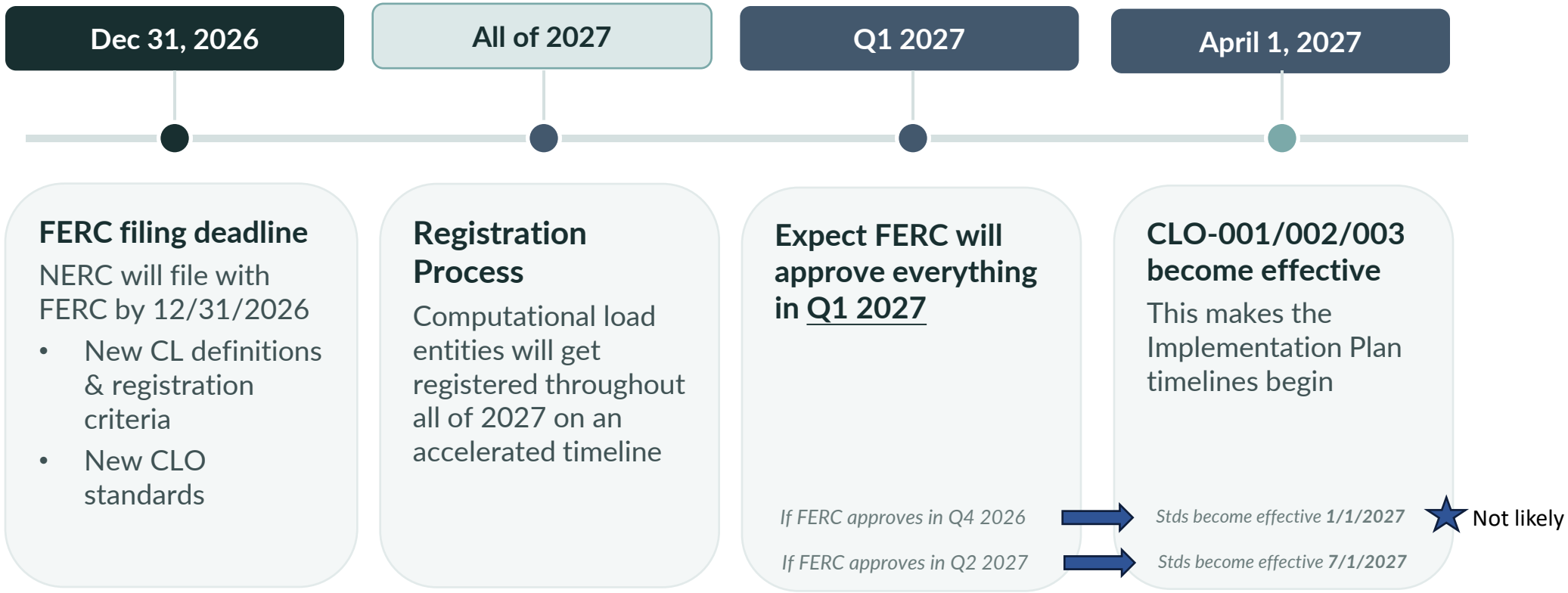
NERC BoT meeting on 10/8, registration staff requesting approval to begin industry outreach/data gathering for CLO registration

New NERC CLO Standards

- **CLO-001**: Interconnection, Studies, & Modeling Data
  - For future or modified facilities, must participate in the Transmission **Provider's interconnection process/studies/commissioning reqs**, and ensure facilities meet the new **interconnection requirements**
  - For ALL facilities, must provide detailed verified/validated **models** to the applicable Transmission Providers (meeting their modeling requirements)
- **CLO-002**: Operational Data & Communications
  - Must share real-time **operational data**
  - Must have real-time **operators** that are regularly trained, always available via a defined communication medium, and responding to Operating Instructions
- **CLO-003**: Protection & Disturbance Monitoring
  - Must have a defined/implemented process for **protection system** settings/coordination
  - Must have high-resolution **monitoring equipment** installed to capture system events/disturbances
- **CLO-004***: Disturbance Performance & Ride-through
  - This standard will define the ride-through and disturbance performance requirements for CL Sites
  - This is NOT yet drafted, just beginning the drafting process.
  - **The standard # is not yet defined, so this is just an estimate for easier communications.*

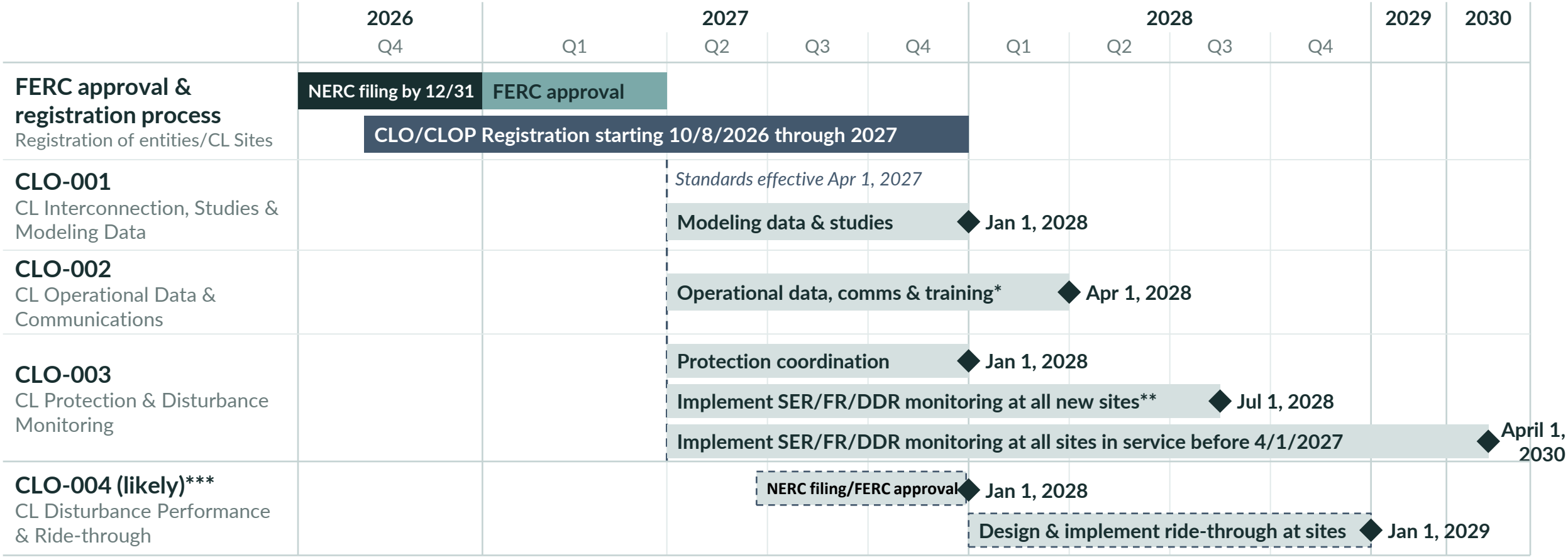
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Potential NERC CLO-001/002/003 Compliance Timelines



NERC Computational Load Roadmap

All dates are estimates based on a FERC approval in Q1 2027



CL = Computational Load.

*Extensions possible for CLO-002 R8–R15.
**Extensions possible for CLO-003 R1–R8.
***Not yet drafted. Assumes FERC filing mid-2027, effective Jan 1, 2028, and PRC-029 implementation plan timing.

CLO-001: Computational Load Interconnection, Studies & Modeling Data

Interconnection Requirements & Studies

- R1: TO & DP must create Computational Load Site (CLS) interconnection requirements (IRs)
- R2: Those IRs must include coordination activities with other applicable transmission entities, and commissioning activities with CLSs
- R3: Generator Owners must make CLS IRs when a CLS is interconnecting to their generation facility
- R4: TPs and PCs must study the reliability impact of interconnecting CLSs using steady state, short circuit, and dynamic studies for new interconnection or existing interconnection seeking to make a qualified change
- R5: **CL Owner** must coordinate/cooperate on these studies with the TO, GO, DP, TP, or PC
- R6: TOs, GOs, and DPs must coordinate with the TP or PC on these studies
- R7: Each PC must make a publicly available definition for *qualified change:*

*A **qualified change** under FAC-002-4 refers to specific equipment modifications or operational upgrades to existing facilities that could impact the reliability of the Bulk Electric System (BES)*

From the Level 3 Alert:

- PCs should revise "qualified change" to include:
  - Growth of computational load, year-over-year
  - Changes to settings, parameters, or configurations that affect electrical supply equipment and end-use equipment (i.e., changes the compute end-use characteristic).
  - Repurpose of load to different applications (e.g., AI training to data warehousing)

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CLO-001: Computational Load Interconnection, Studies & Modeling Data

Planning Modeling Data

- R8: PCs/TPs must make CLS modeling data requirements, including steady state, short circuit, and dynamic modeling data
- R9: **CL Owners** must provide the modeling data required by the PCs/TPs in R8
- R10: **CL Owners** must update the modeling data when technical model issues are brought up by PCs/TPs
- R11: **CL Owners** must provide Model Verification documentation for the modeling data provided under R9
  - Model Verification: The process of confirming that model structure and parameter values are representative of the equipment or facility design and settings by reviewing equipment or facility design and settings documentation.
  - Modeling data provided under R9 needs to demonstrate that the configurable, site-specific parameters of the model(s) are representative of the design and settings of the **in-service** equipment of the Computational Load Site

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CLE-002: Computational Load Operational Data & Comms

Operations Data

- R1, R2, R3: Transmission Operators, Balancing Authorities, and Reliability Coordinators must make CSL data/information specs for Operational Planning Analyses, Real-time monitoring, and Real-time Assessments
  - Includes things like real time SCADA measurements, alarms, controls, etc.
- R4, R5, R6: TOP, BA, and RCs must distribute its CLS data/information specs to applicable entities (ex: CL Operators)
- R7: **CL Owner and CL Operator** must meet the obligations defined in R1, R2, and R3 specifications

Operations Instructions

- R8: **CL Operators** must comply with TOP/BA/RC Operating Instructions
- R9: **CL Operators** must inform TOP/BA/RC if it is unable to comply with an Operating Instruction

Operating Instruction: A command by operating personnel responsible for the Real-time operation of the interconnected Bulk Electric System to change or preserve the state, status, output, or input of an Element of the Bulk Electric System or Facility of the Bulk Electric System or a Computational Load Site. (A discussion of general information and of potential options or alternatives to resolve Bulk Electric System operating concerns is not a command and is not considered an Operating Instruction.)

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CLE-002: Computational Load Operational Data & Comms

Interpersonal Communications

- R10: TOP/BA must have Interpersonal Communication capability with CL Operators
  - Interpersonal Communication: Any medium that allows two or more individuals to interact, consult, or exchange information.
- R11: **CL Operator** must have Interpersonal Communication capability with its BA and TOP
- R12: TOP/BA must notify entities within 60 minutes of the detection of a failure of its Interpersonal Communication capabilities that last 30 minutes or longer
- R13: **CL Operator** must consult with any impacted entities (BA and/or TOP) if it detects a failure of its Interpersonal Communication capability, and determine mutually agreeable actions for restoration
- R14: **CL Operator** must conduct initial training for each of its operating personnel who can receive an oral two-party, person-to-person Operating Instruction
  - 3-part communications: receive communication, repeat back communication, get confirmation from sender on correct communication
- R15: **CL Operator** must have each its operating personnel use 3-way communications when receiving Operating Instructions during an Emergency

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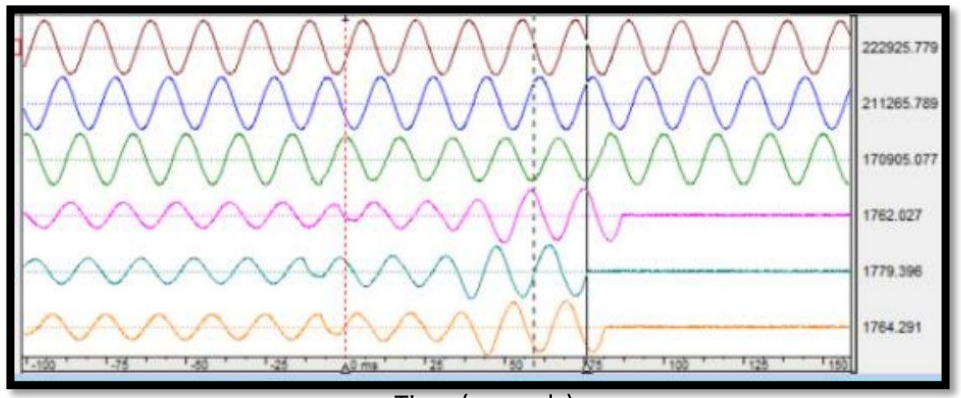
CLE-003: Computational Load Protection Coordination & Disturbance Monitoring

High-Resolution Monitoring

- R1: **CL Owner** must have Sequence of Event Recording (SER) data for each applicable circuit breaker (open/close status) when a ride-through operation or trip occurs

Date, Time, Local Time Code, Site Name, Device[3], State[4]
08/27/23, 23:58:57.110, -5, Site name 1, Breaker 1, Close
08/27/23, 23:58:57.082, -5, Site name 2, Breaker 2, Close
08/27/23, 23:58:57.214, -5, Site name 2, Building 2, dc overcurrent trip

- R2: **CL Owner, TO, DP or GO** must have Triggered Fault Recording (FR) data on the high-side of the main power transformer(s) that it owns or common points of connection(s)
  - R3: FR data must meet the requirements in R3 (recording rate, triggers, record length)

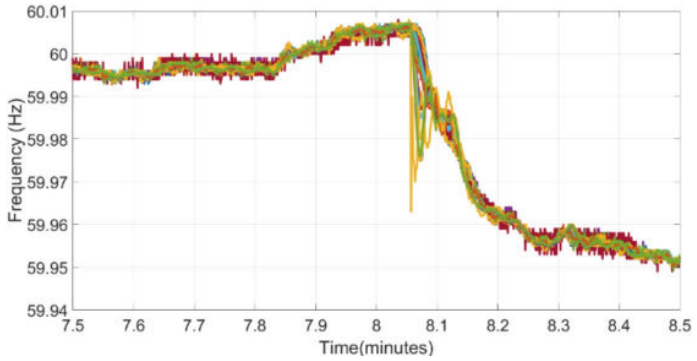


Time (seconds)

CLE-003: Computational Load Protection Coordination & Disturbance Monitoring

High-Resolution Monitoring

- R4: **CL Owner, TO, DP or GO** must have continuous dynamic disturbance recording (DDR) data [also called PMU data] on the high-side of each main power transformer(s) that it owns or common point of connection(s)
  - R5: DDR data must meet specific R5 requirements (input/output sampling rates)



- R6: **CL Owner, TO, DP or GO** must ensure all SER, FR, and DDR data is time synchronized to +/- 1 millisecond
- R7: **CL Owner, TO, DP or GO** must have 20 days of storage for all SER, FR, DDR data; and must provide all data to its Transmission entities within 15 days of the request and be in specific file formats/naming formats
- R8: **CL Owner, TO, DP or GO** upon discovery of a data recording failure, must fix the recording capability within 90 days or create/submit a Corrective Action Plan to Regional Entity within 90 calendar days.
  - Regional Entities: WECC, Texas RE, MRO, RF, SERC, NPCC

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(3) CLE-003: Computational Load Protection Coordination & Disturbance Monitoring

Protection Coordination

- R9: **CL Owner** must have a process for developing Protection System settings at its CLS such that protection systems operate in the intended sequence during faults; and must coordinate its Protection Systems with its TO/GO/DP
- R10: **CL Owner** must use the process in R9 to develop its Protection System settings for Computational Load Sites (CLS)

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Future Computational Load Standards via NERC's LLWG SAR Roadmap

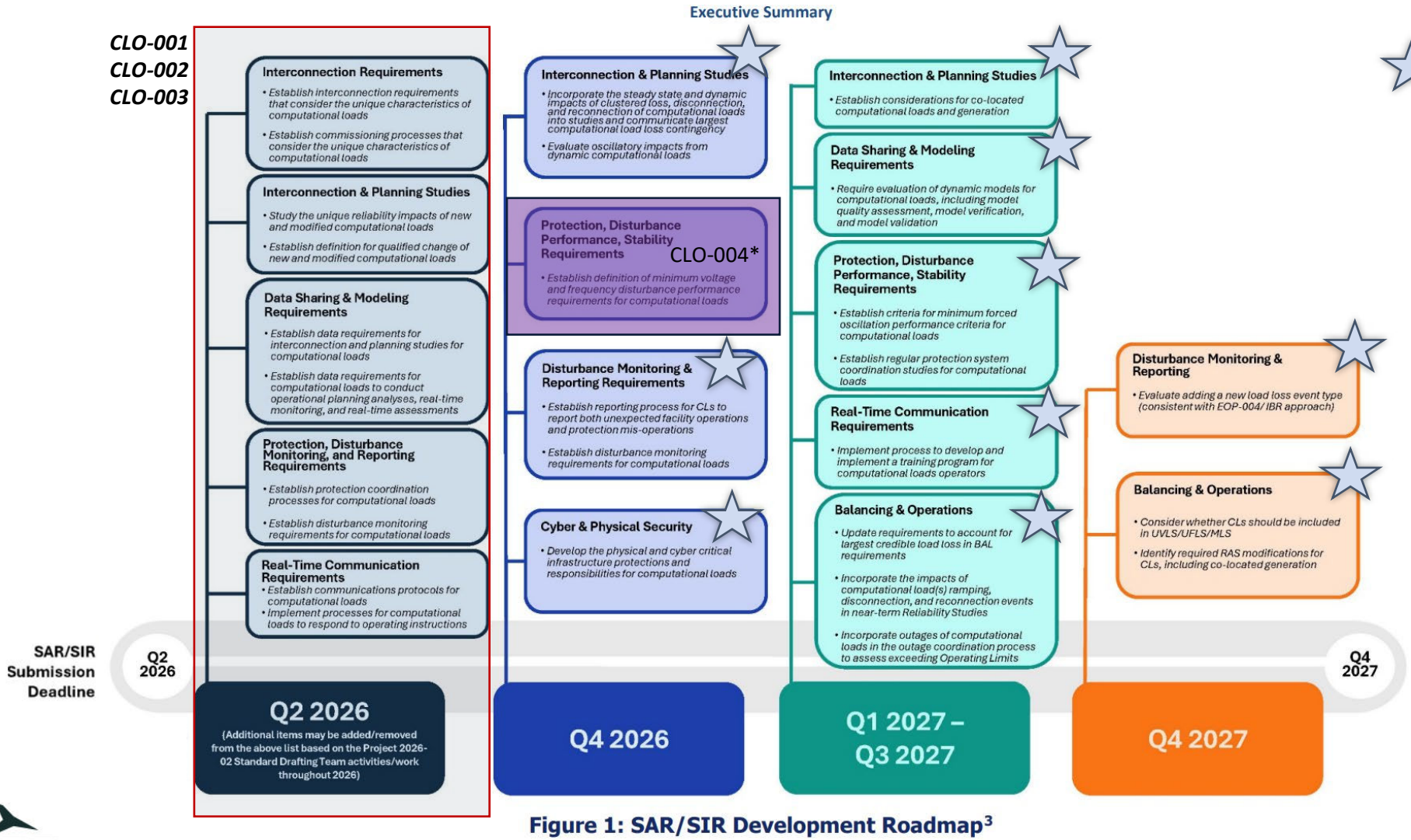


Figure 1: SAR/SIR Development Roadmap[3]

10 future CLO standards, making a total of approximately **14 new or updated** standards

* Official Standard # unknown at this time

Source: https://www.nerc.com/globalassets/who-we-are/standing-committees/rstc/llwg/llwg-sar-roadmap.pdf

Group Discussion

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Discussion Topics

- Have any IAG participants made any substantive updates/progress on Computational Load interconnection and modeling requirements they would like to share?
- How are your organizations thinking about the CLOs standards and compliance obligations to meet the new requirements?
- Have internal SMEs been assigned to work on these efforts yet?
- What other challenges and obstacles are you experiencing?
- Other topics of interest?

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