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		Version No.	6.7
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Load Management Programs and Underfrequency Load Shedding		**Distribution Restriction: None**	

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Appendix **9**

Purpose

Provides description and actions for underfrequency load shedding and load management programs.

1. Responsibilities

CAISO Manager, Balancing Authority (BA) Operations	Initiates implementation of load management programs. Initiates response and restoration of load following an underfrequency load-shedding event.

California ISO (CAISO) System Operator	Hold authority, as delegated by the Executive Officers of the CAISO, to take or direct timely and appropriate Real-Time actions necessary to ensure reliable operation of the CAISO Controlled Grid, up to and including shedding of firm load to prevent or alleviate system operating limit or interconnection reliability operating limit violations. These actions may be performed without obtaining approval from higher-level personnel within the CAISO.
Participating Transmission Owner (PTO)	Implement and direct local area Load Shedding plans at the direction of the CAISO.
Utility Distribution Company (UDC) **Metered Sub System (MSS)**	Implement and direct local area Load Shedding plans at the direction of the CAISO.

2. Scope/Applicability

2.1. Background

2.1.1. Flex Alert, RDRR, and UDC/MSS Interruptible Load Programs

- The Flex Alert is a communication program that leverages the news media to encourage energy conservation. It is intended to provide an additional level of Demand reduction on the system. The participants are not compensated for Load reduction and there is no obligation by program participants to reduce Demand by any set amount. There is no estimate of the amount of Demand relief that may be achieved under the Flex Alert. The CAISO System Operators will follow CAISO Operating Procedures 4420 System Emergency and 4420B Emergency Guide to implement Flex Alerts.

- Reliability Demand Response Resources (RDRR) are use-limited demand resources that can participate economically in the Day-Ahead market (Similar to a Proxy Demand Resource) and as emergency demand response resources in the Real-Time Energy market. RDRR resources that participate economically in the Day-Ahead must make any remaining capacity not committed in the Day-Ahead available to the CAISO in real-time to alleviate System Emergencies. Once the System Emergency has been resolved, RDRRs are deactivated from real-time participation in the market (until the next emergency) and can only participate economically in the Day-Ahead until then. The CAISO System Operators will follow CAISO Operating Procedures 4420 System

Emergency and 4420B Emergency Guide to implement Demand Response Resources.

- The UDC/MSS Interruptible Load programs were developed through arrangements with subscribing end-use customers taking service under special UDC/MSS tariffs approved by the California Public Utilities Commission (CPUC). These programs may be called by the UDCs/MSSs per their retail program rules or by CAISO System Operators in the Day-Ahead, and/or in Real-Time upon entering into Energy Emergency or a Transmission Emergency. The CAISO System Operators will follow CAISO Operating Procedures 4420 System Emergency and 4420B Emergency Guide to call on UDC/MSS Interruptible Load programs.

  UDC/MSS Interruptible Load programs may require 30 minutes or more to fully implement and therefore are most effective when their anticipated use is coordinated with the UDC/MSS in advance.

2.1.2. Under-Frequency Load Shedding

Following the 1996 WECC Interconnection disturbances, WECC developed the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Plan. This WECC plan provides for system–wide coordinated Load shedding, Load restoration, generator tripping, and Tie tripping.

2.2. Scope/ Applicability

This procedure applies to the CAISO, as well as PTOs, UDCs, MSSs, and PGs within the CAISO Balancing Authority Area.

3. Procedure Detail

3.1. Manual Load Shedding

Take the following steps when necessary to manually shed load:

During a Transmission or energy emergency, the CAISO may direct PTOs, UDCs, or MSSs to shed load manually. This manual Load Shedding may include firm load and is done using each entity's established respective Manual Load Shedding procedures. The CAISO shall shed customer load in sufficient amount and time to mitigate IROLs, before system separation or collapse occurs, rather than risk an uncontrolled failure of components, or cascading Outages of the Interconnection.

Emergency manual Load shedding may be necessary to (not limited to the examples below):

- Mitigate Line or facility overloading
- Mitigate Low voltage
- Mitigate voltage decline
- Mitigate Low frequency
- Mitigate frequency decline
- Ensure personnel safety
- Preserve system integrity
- Maintain or recover from generating (Supply) Capacity loss
- Mitigate System Operating Limit (SOL) overloads
- Mitigate Interconnection Reliability Operating Limit (IROL) overloads
- Prevent cascading outages
- Avoid a voltage collapse
- Prevent equipment damage
- Match load with available resources
- Minimize the risk of loss of generation
- Prevent localized or total system collapse

CAISO Manager of BA Operations

1. If need is system-wide and immediate, **manually shed load** as necessary to stabilize the system.
2. If need is system-wide and not immediate, or after initial system stabilization,
   - **Use** the Load shedding tool (located within the ARMS tool under the System Operations menu) to equitably distribute manual load shedding.
     - If the tool is unavailable, **refer** to CAISO Operating Procedure 4510A Load Shed Calculation Guideline.
3. If need is localized and immediate, **manually shed load** at locations that will mitigate the emergency.
4. If need is localized and not immediate or after initial mitigation, **use** the Load shedding tool and **select** only the PTOs that can mitigate the emergency.
   - **Refer** to CAISO Operating Procedure 4510A Load Shedding Calculation Guideline.

3.2. Underfrequency Load Shedding (UFLS)

3.2.1. Preliminary UFLS Operation Assessment

Take the following actions if a UFLS event occurs in the CAISO Balancing Authority (BA):

CAISO Manager of BA Operations, CAISO Transmission Dispatcher
1. **Evaluate** and **stabilize** the CAISO BA. 2. **Determine** Generation and Interconnection status. 3. **Curtail** Interchange Schedules, as required.

CAISO Transmission Dispatcher
1. **Contact** the Adjacent BA, TOP, and the RC. 2. **Provide** CAISO BA status information to the Reliability Coordinator and Adjacent BAs and TOP, as appropriate. 3. **Request** an assessment of conditions and updates as developing or significant events occur. 4. **Provide** a report of CAISO BA conditions and updates as developing or significant events occur.

3.2.2. Declaration of CAISO Emergency following UFLS Operation

Take the following actions if underfrequency load shedding (UFLS) occurs within the CAISO Balancing Area and restoration of load will take a prolonged period of time:

CAISO Manager of BA Operations
1. **Declare** a Transmission Emergency or Energy Emergency as appropriate for the conditions that initiated the UFLS event. 2. **Refer** to CAISO Operating Procedure 4420B Emergency Guide.

3.2.3. Conference Call Bridge for UFLS

Take the following actions if it is determined that events require a conference call bridge, or restoration can be more effectively managed using a conference call:

CAISO Manager of BA Operations
1. **Establish** a conference call **using** the CAISO's established conference call services **with** impacted BAs, TOPs, PTOs, UDCs and MSSs. 2. **Provide** all participants with associated dial-in number and pass-code. 3. **Conduct** a public roll call (to **determine** who is online and to **provide** other participants with the opportunity to know who else is listening). 4. **Contact** the RC and **offer** conference-calling capabilities or **participate** in the conference call established by the RC. 5. **Call** participants not involved with conference call as resources are available **with** periodic updates that are relevant. 6. **Send** MNS and Grid Messaging System (GMS) messages, as appropriate.

3.2.4. Automatic Load Restoration Adjustment

Take the following actions to identify Automatic Load Restoration (ALR) status and to adjust the system:

CAISO System Operator
1. **Refer** to CAISO Operating Procedure 4510C UFLS and Islanding Information by PTO Area for important frequency triggers and set points. 2. If ALR has been identified and may cause frequency decay or grid instability during restoration, **direct** Control Room operators of service territories where ALR is enabled to: • **Disable** ALR if possible **without** jeopardizing reliability and safety, or (where disabling is not possible), • **Shed** other Load in amounts necessary to maintain stable and sufficient frequency during ALR. 3. If CAISO is operating in several islands and the interties are open, **refer** to CAISO Operating Procedure 4610 System Restoration for additional guidance.

3.2.5. Generation Stabilization and Restoration

An underfrequency event may cause Generating Units to trip or to be isolated in electrical islands. The following discusses potential actions in event of this occurrence.

3.2.5.1. Status of Generating Units Determination

Take the following actions immediately if frequency decays to 59.5 Hz or lower:

Scheduling Coordinator (SC), Participating Generator (PG), Participating Transmission Owner (PTO)
1. If there is an indication of frequency decay, **notify** the CAISO Generation Dispatcher.

CAISO Generation Dispatcher
1. If advised by a PTO, Scheduling Coordinator (SC), or Participating Generator (PG) that frequency at a Generating station decayed to 59.5 Hz or lower: • **Evaluate immediately** the status of Participating Generators. • **Identify** available Generating Capacity that may help **stabilize** and/or **restore** frequency. • If the reporting Generating station is islanded, **refer** to CAISO Operating Procedure 4510E Islanding Guide. 2. If there is no effective Generation available to **restore** frequency, • **Manually shed load,** as per Section 3.1 Manual Load Shedding.

4. Supporting Information

Operationally Affected Parties

Shared with the Public.

References

Resources studied in the development of this procedure and that may influence some steps taken herein include but are not limited to:

CAISO Tariff	

CAISO Operating Procedure	4420 System Emergency 4420B Emergency Guide 4510A Load Shed Calculation Guideline - Public Attachment 4510C UFLS and Islanding Information by PTO Area 4510E Islanding Guide 4610 System Restoration
NERC Requirements	EOP-011-4 R1.2.5 & R2.2.2.8; NUC-001-4
WECC Criterion	
Other References	Transmission Control Agreement and Coordinated Functional Registration Agreement - Per the Coordinated Functional Registration (CFR) with PGAE for NUC-001-4, R9.3.7, the Topology Estimator (TE) is required to coordinate the Nuclear Plant Licensing Requirements (NPIRs) with transmission system special Protection Systems and Underfrequency and undervoltage load shedding programs. WECC Southern Island Load Tripping Plan

Definitions

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the CAISO Tariff shall have that meaning when capitalized in this Operating Procedure.

The following additional terms are capitalized in this Operating Procedure when used as defined below:

None.

Version History

Version	Change	Date
6.0	Annual Review: Updated Frequency to “Annual” to align with 4510A & 4510C. Provided acronym detail in References section. Replaced instances of ISO with CAISO. Removed history prior to 5-years. Minor format and grammar updates.	5/06/21
6.1	Annual Review: Removed Staged energy emergency references. Updated procedure references, minor formatting, and grammar updates. Updated reference of NUC-001 in References section. Removed history prior to five years.	5/01/22

Version	Change	Date
6.2	Annual Review: Updated EOP-011 reference to EOP-011-2. Updated instance of Reliability messaging system to Grid Messaging System (GMS).	5/04/23
6.3	Replaced Shift Manager with Manager, Real-Time Operations and Manager of Real-Time Operations. Replaced Transmission and Generation "Desk" with "Dispatcher." Minor format and grammar edits.	9/11/23
6.4	Annual Review: Removed history prior to five years. No content changes.	5/17/24
6.5	Annual Review: Minor formatting and punctuation edits. References: Added NUC-001-4 and updated EOP-011 version number due to standard update.	5/01/25
6.6	Replaced Manager, Real-Time Operations and Manager of Real-Time Operations with Manager, BA Operations and Manager of BA Operations. Minor formatting and grammar edits.	11/06/25
6.7	Annual Review: Updated from "FIT" to "ARMS" tool/software. Minor formatting and one minor punctuation edit.	5/26/26

5. Periodic Review Procedure

Review Criteria & Incorporation of Changes

There are no specific criteria for reviewing or changing this document, follow instructions in CAISO Operating Procedure 5510.

Frequency

Annual

Appendix

4510A Load Shed Calculation Guideline
4510B Demand Response and UDC Interruptible Programs
4510C UFLS and Islanding Information by PTO Area
4510E Islanding Guide
4510F Reliability Demand Response Resource (RDRR) Daily Reporting Template