High-Performance Measure Details

Measure Name
High Efficiency Elevators

Use Category
Elevators

Effective Date
December 08, 2025

End Date
N/A

Version
4

Measure Code
LM448

Measure Stage
Early Adoption

Metering Interest Level
Medium

Table of Contents

Technology Summary

This measure outlines efficiency criteria for elevators in non-residential buildings and high-rise multi-family housing. It sets efficiency targets per the International Organization for Standardization (ISO) Standard 25745-2. This standard prescribes two metrics for calculating elevator efficiency: specific running energy (in milliwatt-hours per kilogram-meter) and standby power (in Watts). The standard then defines seven performance classes for each of these two metrics. Elevators meeting ISO Standard 25745-2's middle-efficiency performance levels (Level 4) can achieve energy savings of up to 65%, and elevators at the highest performance levels (Level 1) can save 92% of energy, compared to the elevators at lowest performance levels (Level 7). This is significant in high-performance buildings where other energy use categories have been minimized.

This measure also highlights the requirements for traction (cable) and hydraulic elevators, including the use of regenerative and variable frequency drives to improve energy efficiency. Traction elevators, which use a counterweight system, are generally more energy-efficient than hydraulic elevators, which rely on hydraulic fluid and a pump to lift the car. The inclusion of regenerative drives in traction elevators can significantly reduce energy consumption by returning energy to the building's grid during operation. Regenerative drives are primarily

applicable to traction elevators, where they capture kinetic energy during descent and convert it into electrical energy, reducing overall energy use by up to 40% compared to non-regenerative systems. Hydraulic elevators can incorporate variable frequency drives or high-efficiency pumps to reduce energy consumption, though they may not achieve the same efficiency levels as traction elevators with regenerative drives.

This High-Efficiency Elevator measure sets independent performance level requirements for specific running energy and standby power. The Code Readiness program seeks to gather data on elevator usage and the performance of higher efficiency installations to validate the ISO standard in California and support the development of more stringent elevator efficiency codes. For the Code Readiness program, information on elevator usage and performance of higher efficiency installations would help validate the ISO standard in California and would provide data to support the analysis of efficiency codes for elevators.

Alignment with CEDA Program Goals

The CEDA program supports the implementation of energy efficiency measures that support Code Readiness's Long Term Tactical Plan (LTTP) to drive the goals of electrification, decarbonization, and load reduction.

Projects must meet one of the CEDA Inducement Requirements identified in the next section to receive an inducement and will be evaluated for level of interest in metering to support Code Readiness Objectives.

This measure meets the CEDA program goals as follows:

- **Building partnerships with market stakeholders** by consulting on innovative technologies and best practices in energy efficiency, which can lead to the development of more effective solutions and accelerate the adoption of new technologies. As teams adopt the measure, this increases the volume of engineers able to design the equipment, contractors capable of installing the equipment, and owners able to operate the equipment.
- **Increasing the supply of high-performance measures and all-electric buildings** by combining electrification with energy efficiency that can result in projects implementing measures to achieve greater energy savings, reduced emissions, and overall improved building performance. As more buildings specify and install high performance elevator technologies, this helps to increase the overall supply of elevator technologies in the market for others to use, including beyond new construction.
- **Increasing the demand for high-performance measures and all-electric buildings** by pushing for electrification that drives the need for technological advancements, supporting economic growth opportunities through innovation, and raising awareness of the benefits of electrification to increase consumer adoption. As demand in the market increases for newer technologies, the long-term benefit is increased demand for manufacturers and suppliers to provide additional options available in the market.
- **Advancing new high-performance measure technology** by raising public awareness about new technologies and their benefits, helping build acceptance and demand through market support advocacy efforts that can influence stakeholder decisions that enable technological innovation.
- **Providing Codes & Standards with projects of interest** to collect metered data that will inform future California energy codes.

CEDA Inducement Requirements

The following inducement requirements are designed to accelerate the adoption of high-efficiency elevator technologies in the current market by improving energy performance, reducing operational costs, and supporting statewide decarbonization goals. Project inducements will be determined based on each elevator system's projected energy-savings potential and its contribution to advancing market adoption of higher-efficiency elevator solutions.

This HPM offers three independent design levels: **Essential — High-Efficiency Elevator, Advanced — Enhanced High-Efficiency Elevator**, and **Premium—High-Performance Elevator**. All systems must serve at least three habitable floors above grade and can be either traction (cable) or hydraulic. Additionally, each project must submit the required supporting documentation to be considered eligible.

System Design Requirements

1. **Essential level:** High-Efficiency Elevator
   - 1.1. Energy Performance Rating
     - 1.1.1. Must meet ISO 25745-2 Class C or better.
     - 1.1.2. Must achieve Performance Level 6 or better under ISO 25745-2:
       - 1.1.2.1. Specific Running Energy: ≤ 5.47 mWh/kg·m
       - 1.1.2.2. Idle/Standby Power: ≤ 1,600 W
   - 1.2. Minimum Service Height
     - 1.2.1. Must serve at least 3 habitable floors above grade level.
   - 1.3. (Optional) Control Features
     - 1.3.1. Provide basic dispatch controls to coordinate elevator operation efficiently that includes group control algorithm that coordinates car operation.
2. **Advanced level:** Enhanced High-Efficiency Elevator
   - 2.1. Energy Performance Rating
     - 2.1.1. Must meet ISO 25745-2 Class C or better.
     - 2.1.2. Must achieve Performance Level 6 or better under ISO 25745-2:
       - 2.1.2.1. Specific Running Energy: ≤ 5.47 mWh/kg·m
       - 2.1.2.2. Idle/Standby Power: ≤ 1,600 W
   - 2.2. Service Height
     - 2.2.1. Must serve at least 3 habitable floors above grade level.
     - 2.2.2. If your building is 10 habitable stories or more, see 2.3.2 below.
   - 2.3. Control Features
     - 2.3.1. For Buildings with 3-9 habitable floors above grade level:
       - 2.3.1.1. Group dispatch controls are not required.
     - 2.3.2. For Buildings with 10 or more habitable floors above grade level:
       - 2.3.2.1. Standard destination or group dispatch controls shall be required where building scale and use justify advanced coordination. These apply when:
         - 2.3.2.1.1. The building has 10 or more occupied stories,
         - 2.3.2.1.2. The elevator group includes 3 or more cars serving a common zone.
       - 2.3.2.2. Functional Requirements: The elevator control system shall provide:
         - 2.3.2.2.1. Destination-based passenger assignment to reduce the number of stops per trip.
         - 2.3.2.2.2. Traffic-responsive operation, automatically adjusting to up-peak, down-peak, and mixed traffic conditions.
         - 2.3.2.2.3. Car parking and shutdown modes that reduce idle energy use when demand is low.
         - 2.3.2.2.4. Load and demand balancing across multiple cars to minimize wait times and travel energy.

3. **Premium level:** High-Performance Elevator
   3.1. Energy Performance Rating
      3.1.1. Must meet ISO 25745-2 Class C or better.
      3.1.2. Must achieve Performance Level 6 or better:
         3.1.2.1. Specific Running Energy: ≤ 5.47 mWh/kg·m
         3.1.2.2. Idle/Standby Power: ≤ 1,600 W
   3.2. Service Height
      3.2.1. Must serve at least 3 habitable floors above grade level.
      3.2.2. If your building is 10 habitable stories or more, see 3.3.2 below.
   3.3. Advanced Controls and Monitoring
      3.3.1. For Buildings with 3-9 habitable floors above grade level:
         3.3.1.1. Group dispatch controls are not required.
      3.3.2. For Buildings with 10 or more habitable floors above grade level:
         3.3.2.1. Advanced control features shall be required where building conditions justify dispatch coordination, specifically when all the following are met:
            3.3.2.1.1. The building has 10 or more occupied stories above grade,
            3.3.2.1.2. The elevator system includes 3 or more elevator cars serving a common zone or core.
         3.3.2.2. Functional Requirements: The elevator control system shall provide:
            3.3.2.2.1. Destination-based passenger assignment to reduce the number of stops per trip.
            3.3.2.2.2. Traffic-responsive operation, automatically adjusting to up-peak, down-peak, and mixed traffic conditions.
            3.3.2.2.3. Car parking and shutdown modes that reduce idle energy use when demand is low.
            3.3.2.2.4. Load and demand balancing across multiple cars to minimize wait times and travel energy.
            3.3.2.2.5. Performance monitoring capability to track average wait times, trip counts, and energy consumption for commissioning or ongoing verification.
   3.4. Technology-Specific Energy Enhancements
      3.4.1. *Traction Elevators*: Must include a regenerative drive system to recover and reuse energy during descent.
      3.4.2. *Hydraulic Elevators*: Must include variable frequency drives (VFDs) or other energy-saving enhancements such as high-efficiency pumps and motors.

Notes:

1. *Performance levels (1–6) under ISO 25745-2 indicate increasing levels of energy efficiency, with 1 being the best.*
2. *While traction and hydraulic elevators are both suitable options, traction systems more readily meet higher energy efficiency levels due to their inherent design advantages.*

Supporting Documentation Requirements

1. **Required for All Projects (Essential, Advanced and Premium Tiers)**
    - 1.1. Elevator System Cut Sheets or Technical Specifications
        - 1.1.1. Provide manufacturer cut sheets or product documentation verifying key features such as motor type, drive type (e.g., gearless traction, permanent magnet), and efficiency ratings. Must include model number, rated capacity, speed, and ISO 25745-2 class and performance level (if available).
    - 1.2. Environmental Product Declaration (EPD)
        - 1.2.1. If available, submit the elevator manufacturer's EPD documenting verified ISO 25745-2 energy performance data (e.g., annual energy use, class rating, and tested Specific Running Energy/Idle Power).
    - 1.3. As-Built Mechanical and Electrical Drawings
        - 1.3.1. Submit as-built schedules or drawings confirming the elevator system was installed as specified and matches the high-performance design criteria.
    - 1.4. Commissioning Report or Functional Testing Verification
        - 1.4.1. Provide commissioning documentation verifying the elevator system was tested and operates per the design intent.
            - 1.4.1.1. Include verification of energy-efficient operation modes (e.g., sleep mode, standby lighting, dispatch optimization, or VFD ramping).
    - 1.5. Controls Integration Documentation (Where Applicable)
        - 1.5.1. Provide evidence of installed dispatch control or monitoring systems used to optimize performance or track usage patterns.
            - 1.5.1.1. Acceptable documentation may include system design specifications, screen captures of control interfaces, or integration logs.
    - 1.6. Elevator System Cost Information
        - 1.6.1. Submit cost documentation, including equipment, installation labor, and any additional costs associated with high-efficiency features.
            - 1.6.1.1. Acceptable formats include bid sheets, contractor invoices, or internal cost breakdowns.
2. **Additional Documentation Required for Premium Tier Projects Only**
    - 2.1. Regenerative Braking System Verification (Traction Elevators Only)
        - 2.1.1. Provide documentation confirming the inclusion of a regenerative drive system.
            - 2.1.1.1. This may include product literature, cut sheets, or system specifications showing energy recovery capabilities.
    - 2.2. Hydraulic System Energy Efficiency Enhancements (Hydraulic Elevators Only)
        - 2.2.1. If a hydraulic elevator is used, provide documentation showing the use of energy-saving components (e.g., VFDs, motors, or high-efficiency pumps).
            - 2.2.1.1. Acceptable evidence includes product specs or installation notes.
    - 2.3. Energy Monitoring or Usage Data
        - 2.3.1. Provide minimum 1-week energy monitoring data for the elevator system(s). Data may come from submeter(s), control software, or monitoring dashboards.

Code Readiness Objectives

Define minimum prescriptive efficiency criteria for elevator energy in Title 24 part 6 and/or support high-efficiency measure criteria for any efficiency credits requirement if and when they are included.

There are also additional opportunities for future research:

- Conducting a cost-benefit analysis of the initial investment versus long-term savings and environmental impact of high-efficiency elevators
- Exploring how high-efficiency elevators can be integrated with smart building systems for optimized performance, energy use tracking, and adaptive usage patterns (such as deep standby mode)

Site Metering Prerequisites

To support system performance monitoring and data collection, each project shall provide access for metering and communication equipment installation according to the following:

- Projects equipped with a Building Automation System (BAS), Energy Management System (EMS), or equivalent platform should enable integration of advanced metering devices through that system to facilitate data collection and remote access.
- Projects without a BAS/EMS shall allow the Code Readiness team to install temporary stand-alone data loggers, sensors, and communication equipment as needed to monitor system performance. Metering equipment may be deployed on-site for a monitoring period of up to 12 months.

Data Benefits

The collected data will assist the codes and standards advocacy team in advocating for stricter elevator efficiency criteria in Title 24, Part 6. Information on the usage and performance of high-efficiency installations will validate the ISO standard in California and inform any additional assumptions needed for building energy code evaluations.

Sample Data Points

A sample set of data points that would ideally be collected is provided below for reference. This list will be re-developed for each project based on the infrastructure and needs of the monitoring effort:

Data Points to Meter	Unit	Additional Specifications
Power Consumption	W	Maximum and minimum values
Idle Power	W	Maximum and minimum values
Standby Power (Pst_5)	W	Maximum and minimum values
Standby Power (Pst_{30})	W	Maximum and minimum values
Reference cycle energy (E_{rc})	Wh	Maximum and minimum values
Short cycle energy (E_{sc})	Wh	Maximum and minimum values
Door Operation Time (t_d)	S	Maximum and minimum values

Code Reference

2025 Title 24, Part 6, Energy Efficiency Standards for Residential and Nonresidential Buildings

- Specific sections relevant to elevator energy efficiency and corresponding compliance requirements.
- ISO 25745-2 Standards

Detailed categorization of elevator energy efficiency levels and guidelines for implementation in building designs are shown in the following tables:

- Reference tables from ISO Standard 25745-2:2015

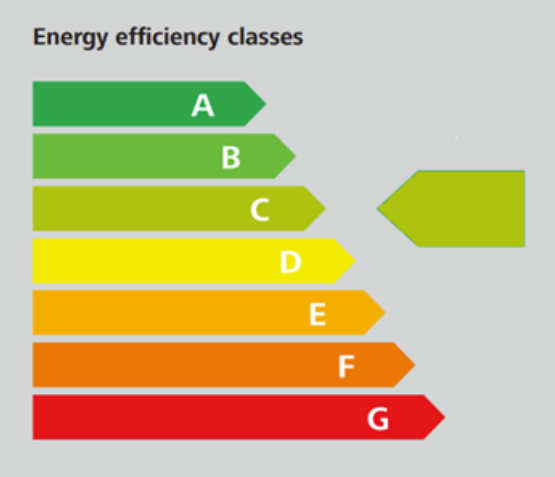
Table 1. Performance Levels for Specific Running Energy (ISO 25745-2, Table 5)

Specific running energy for the average running cycle [mWh/kg.m]	**≤ 0.72**	**≤ 1.08**	**≤ 1.62**	**≤ 2.43**	**≤ 3.65**	**≤ 5.47**	**> 5.47**
Performance Level	1	2	3	4	5	6	7

Table 2. Performance Levels for Idle/Standby Power (ISO 25745-2, Table 6)

Idle / Standby Power [W]	**≤ 50**	**≤ 100**	**≤ 200**	**≤ 400**	**≤ 800**	**≤ 1600**	**> 1600**
Performance Level	1	2	3	4	5	6	7

- Energy Efficiency Letter Grade Classes per ISO Standard 25745-2:2015



Eligible Climate Zones and Building Types

Eligible Climate Zones

This measure applies statewide in **California Climate Zones 1-16** (Title 24). Applicants must identify the project's climate zone in the submittal.

Eligible Building Types

This measure applies to:

- **High-Rise Multifamily**: Classified as multifamily buildings with four or more habitable stories above grade.
- **Nonresidential**: Commercial, public, agricultural, and industrial facilities (e.g., offices, retail, lodging, education, healthcare, food service, warehouses, manufacturing, civic buildings).

Eligible Project Scopes

This measure applies to:

- **New construction**, **additions**, and **major alterations** where the project includes the installation of new elevator(s) eligible under this measure.

Measure Exclusions

This high-performance measure excludes the following:

- Elevators serving fewer than three floors above grade.
- Partial upgrades or component-only work (elevator lighting, cab finishes, door equipment, or controller reprogramming without full modernization).
- Conveyance systems that are not standard passenger elevators (LULA lifts, VPLs, dumbwaiters, material lifts).
- Elevators serving only non-habitable spaces (mechanical penthouses, parking levels only, warehouses without occupiable floors).

Reviewer Checklist

High-Performance Measure Review Checklist: High Efficiency Elevators

Checklist Description: This checklist captures the elements that must be present in the project design to be eligible for the high-performance measure inducement or consideration for additional site metering.

Project Name: _____ **Review Date:** _____

Assessment:

- ☐ Approved
- ☐ Not approved

Notes:

Reviewer: _____ **Signature:** _____

Inducement Requirements – Essential Level	Comments
☐ Do energy performance ratings meet System Design Requirements 1.1?	
☐ Does the minimum service height serve at least 3 habitable floors above grade level?	
☐ If control features are installed, do they coordinate elevator operation and car coordination efficiently?	

Inducement Requirements – Advanced Level	Comments
☐ Do energy performance ratings meet System Design Requirements 2.1?	
☐ Does the minimum service height serve at least 3 habitable floors above grade level?	
☐ Do control feature requirements meet System Design Requirements 2.3?	

Inducement Requirements – Premium Level	Comments
☐ Do energy performance ratings meet System Design Requirements 3.1?	
☐ Does the minimum service height serve at least 3 habitable floors above grade level?	
☐ Do advanced control and monitoring features requirements meet System Design Requirements 3.3?	
☐ Do technology-specific energy enhancement requirements meet System Design Requirements 3.4?	

Supporting Documentation Requirements – All Levels	Comments
☐ Were elevator system cut sheets or technical specifications provided?	
☐ Was the Environmental Product Declaration (EPD) provided?	
☐ Were as-built mechanical and electrical drawings provided?	
☐ Was the commissioning report or functional testing verification documents provided?	
☐ Were controls integration documents provided, where applicable?	
☐ Was elevator system cost information provided?	

Additional Supporting Documentation Requirements – Premium Level Only	Comments
☐ Were regenerative braking system verification documents provided (traction elevators only)?	
☐ Were hydraulic system energy efficiency enhancement documents provided (hydraulic elevators only)?	
☐ Were energy monitoring or usage data provided according to Supporting Documentation Requirements 2.3?	

Version History Log

Version	Effective Date	End Date	Change Description
1	October 24, 2023	December 04, 2023	N/A
2	December 05, 2023	March 14, 2024	Updated and reformatted memo
3	March 15, 2024	December 07, 2025	Updated requirements: inducement definition and incremental cost method
4	December 08, 2025	N/A	Updated format, measure requirements, code references, eligibility, exclusions, checklist