

Siemens Site Controls™ EMS Support for Title 24 Compliance

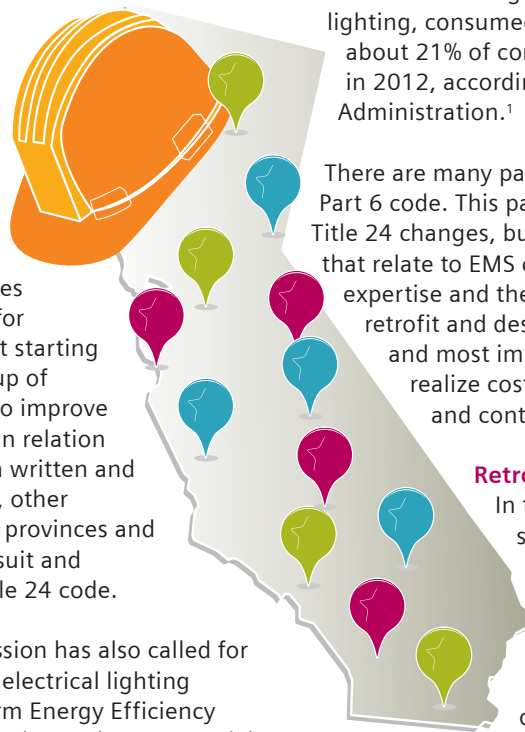
Meeting California 2013 Title 24 Part 6 requirements today
and in the future

White Paper | October 2014

Overview

In the U.S., the construction and operation of buildings accounts for nearly 40 percent of all domestic energy consumed. To regulate energy consumption across the state, and ensure that there will be enough energy reserve available in case of crisis, California Title 24 building codes were updated and became effective for building designs submitted for permit starting July 1, 2014. It is composed of a group of standards and regulations designed to improve the state's standards and conditions in relation to how energy is regulated. Although written and maintained by the State of California, other municipalities and states – as well as provinces and territories in Canada – are following suit and adopting aspects of the California Title 24 code.

The California Public Utilities Commission has also called for a 60% to 80% statewide reduction in electrical lighting consumption by 2020, in its Long Term Energy Efficiency Strategic Plan. This is on top of the goal to make commercial construction net-zero by 2030. Since lighting currently accounts for nearly 30 percent of California's electricity use, the extensive use of lighting controls is absolutely essential to meeting these net-zero goals. At a national level, the



commercial sector, which includes commercial and institutional buildings, and public street and highway lighting, consumed about 274 billion kWh for lighting or about 21% of commercial sector electricity consumption in 2012, according to the U.S. Energy Information Administration.¹

There are many parts to California's new 2013 Title 24, Part 6 code. This paper is not an exhaustive summary of Title 24 changes, but rather highlights the parts of the code that relate to EMS capabilities. Siemens system integration expertise and the Site Controls solution can help you retrofit and design stores according to the new code, and most importantly, ensure you continue to realize cost savings through above-site visibility and control.

Retrofits & Adaptive Lighting

In terms of energy savings, the most significant change in the new Title 24 standards is that more retrofit projects will be required to meet the new-construction standards for lighting than under the 2008 code. Exempt are spaces where less than 10 percent of the lighting is being changed out, or buildings in which fewer than 40 ballasts are being replaced. In all other instances, all new lighting must not only meet the lighting power density (LPD) requirements, but also most of the controls requirements (including dimming).

¹ <http://www.eia.gov/tools/faqs/faq.cfm?id=99&t=3>

There are also new requirements to implement adaptive lighting, lighting that automatically dims or shuts off when not needed, by incorporating photo sensors, occupancy sensors and multi-level lighting controls into indoor and outdoor fixtures. The California Energy Commission projects the non-residential standards alone will save the state 372 GWh per year.²

Under the new Title 24 standards, areas of buildings that are not occupied 24/7 will no longer be able to leave the lights on. Modest allowances for egress lighting will remain, but, just like general lighting, egress lighting will have to be shut off outside occupied times.

Many retailers with large storefront windows can “harvest” daylight by using ambient light and temporarily dimming in-store lighting. Daylighting control requirements have also been expanded. The new code requires photocontrols in all interior daylit spaces with at least 120W of installed lighting power. This significantly expands the number of spaces required to use photocontrols, affecting practically every office or commercial space with skylights or windows.

New Construction and Daylight Harvesting

New construction requirements include installation of high performance windows, sensors and controls. Incorporating natural “daylighting” helps avoid unnecessary use of installed lighting. The sensors and controls used for “harvesting” are also required for utility signal control (-15% from FS).

Outdoor Lighting

Outdoor lighting is also undergoing some major changes: all outdoor lighting has to have both a photocontrol and an automatic scheduling control system. Motion sensor controls will also be required for all outdoor lighting mounted 24 feet above the ground or lower, and for any incandescent luminaires over 100 watts. Controls must



reduce lighting power to each luminaire by at least 40 percent when the lights are not in use. For the first time, lighting in parking garages, lots, and loading and unloading areas will also be required to have occupancy controls, with at least one step between 20 and 50 percent of full lighting power. Controls will have to reduce lighting power in these spaces by at least 50 percent during unoccupied periods.³

HVAC/Economizer

The 2013 Title 24 code requires that economizers be installed on Roof Top Units (RTUs) with cooling capacity equal to or greater than 54,000 Btuh. This means 4.5-ton RTUs and larger must have an economizer, down from 6¼-ton RTUs in prior versions. New to Title 24, controls for economizers must have a Fault Detection and Diagnostic (FDD) system that meets a list of requirements in section 120.2(i). This means the controller must provide a means of communicating a specific failure and specifically what is wrong with it. If for example; an outside air sensor malfunctions, the controller must provide a notification signal or LED screen to display the status of the economizer error.

Demand Response Participation

To help protect the electrical grid during times of peak energy demand, businesses participate in load management programs like demand response (DR). Under the 2008 code, DR capability was only required of retail buildings with sales floor areas over 50,000 square feet in size. 2013 Title 24, Part 6 applies the DR requirement more broadly, to help drive usage and peak demand down in all commercial buildings at least 10,000 square feet in size. When utilities issue a DR signal to these buildings, they must be capable of automatically reducing their lighting energy use to a level at least 15 percent below the building’s maximum lighting power. As is the current case, designers are responsible for specifying controls that are compatible with the local utility’s DR protocol, and building operators are responsible for programming the lighting controls to automatically reduce lighting power consumption in response to DR signals.

² <http://lighting.com/t24-smart-lighting-standard/> ³ <http://lighting.com/t24-smart-lighting-standard/>

How Site Controls EMS Supports Compliance

The Site Controls integrated energy management solution, consisting of hardware, software and professional services, provides the operational visibility and tools needed to actively monitor and control energy consuming devices

across an enterprise. The system integrates all remote site monitoring data received for each controller into actionable regional and enterprise level views. Many of the tools you need to confirm Title 24 compliance are already at your fingertips:

Summary of EMS Features Supporting Title 24 Compliance

Requirement	Relevant Section	Description
Automatic Daylighting Controls	Sec 130.1(d)	Indoor light sensors and dimmable ballast controls 10-100%.
Demand Response Controls	Sec 130.1(e)	15% reduction from maximum when signaled
Outdoor Lighting Controls and Equipment	Sec 130.2(c)	Automatic Lighting Control for outdoor sales, canopies, facade, ornamental and dining
Fenestration Products and Exterior Doors	Sec 110.6	Automatic control of window and skylight coverings
Manual Overrides	Sec 110.9	On-site user-controlled manual overrides
Submetering	Sec 130.5	Disaggregate loads by types defined (HVAC, Lighting, Plug, Pumps, etc)
Economizer Fault Detection and Diagnosis (FD&D)	Sec 120.2(i)	Required monitoring of FD&D subsystems
Demand Control Ventilation (DCV)	Sec 120.1(c)	Monitored and recorded by a control system Failures shall cause reset to design ventilation rate and send alarm
Commissioning	Sec 120.8	A commissioning plan must be included in the design phase

Lighting and Economizer requirements can be met by utilizing the advanced energy reporting, operational dashboards, and comprehensive site analytics that the cloud-based Site Controls™ Enterprise Portal generates. Stakeholders and third-party inspectors can easily access the Site Controls™ Enterprise Portal to quickly verify compliance.

Consulting Specifying Engineer magazine reports that “the ever-increasing complexity of smart building systems and architecture make it imperative for the design and construction team as well as ownership to have open communication and documented coordination.”

Controls providers have a different view and understanding of the building, building systems, and its processes; and as building controls become more sophisticated, input from those who know them and can integrate them becomes more critical. Siemens Client Services experts ensure the right controls are integrated so that maintenance and energy savings deliver sustainable and expandable results. Measurement and Verification (M&V) plans equip building

owners with the tools and capabilities needed to track building systems and equipment performance. This ensures the system is achieving the energy savings it was designed for, and identifying inefficiencies when it is not, while also pinpointing opportunities for ongoing improvements. Your Client Services Manager works closely with staff, designers, and contractors to ensure the necessary resources are in place to achieve and maintain compliance, including:

- Setting strategic objectives and executing tactics to achieve those goals
- Conducting monthly key performance indicator reviews
- Holding quarterly and bi-annual business reviews for stakeholders

The same automated Site Controls Intelligent Load Management™ system that delivers hard cash returns each year for your company's demand response participation is already established to ensure compliance with the updated daylight harvesting and demand response requirements. This automated solution is more highly valued by the grid and, as a result, provides higher incentive payments.

Next Steps for Retailers

Depending on the type of business you operate, lighting accounts for 20% to 50% of electricity consumption. This means that significant cost savings can be achieved with energy-efficiency improvements, and due to continually improving equipment, lighting usually provides a high and easy-to-estimate return-on-investment of major upgrades, reports the U.S. Small Business Administration. Additional energy savings should significantly offset some additional costs as well, such as more extensive daylighting and economizer fault detection and diagnosis.

The biggest decision for retailers will be whether they want to apply the code at their required locations (California and others), and then have a separate design elsewhere, or deploy the capability at all new construction locations. Others will adopt parts of the code, such as implementing photocell or occupancy sensor changes, and then can recoup the retrofit expense through greater energy efficiency.

Title 24 Standards do vary by climate zone (California has sixteen different climate zones) so it is important to note that cost-effective measures taken in more extreme climates may not deliver the same cost-effective results in milder climates.

The availability of rebates for retrofits also varies by location. In San Diego, for example, rebates and incentives will not be provided for measures that are required as part of a Title 24 code-triggering retrofit.

However, the San Diego Gas and Electric Company reports stand-alone measures that do not trigger code may be eligible for incentives. For example, lighting occupancy sensors will not be eligible for rebates effective July 1, 2014, but they may be eligible for incentives if they are installed as a "Retrofit Add-On" measure.⁴

⁴ <http://www.sdge.com/business/title-24-update>

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Another potential savings for retailers can be realized through reduced line voltage wiring costs. The typical example is "checkerboard" lighting that allows half of the fixtures to remain on for employees working after hours. With dimmable ballasts, an electrician wires directly to all fixtures in rows or columns from a line voltage standpoint at significantly reduced labor. The General Contractor should bid this scenario out to determine how much it would lower costs.

This paper touches upon just a few of the 2013 Title 24 code changes and highlights several areas where the Site Controls EMS can help your organization achieve compliance. Expect Title 24 to be revised again and again, so growth, future extensibility, and remote management of your dimmable controls are added values of your energy management system. The Site Controls platform is "future-proof" – it integrates with a variety of equipment and controls – so you stay prepared with the advanced technology and building code requirements of today and tomorrow.

For more information on how the Siemens Site Controls System can be used to achieve Title 24 code requirements, please contact Siemens Retail & Commercial Systems at (512) 306-9400 or retail.commercial.systems.industry@siemens.com.

www.siemens.com/sitecontrols