Electrical Submetering in California

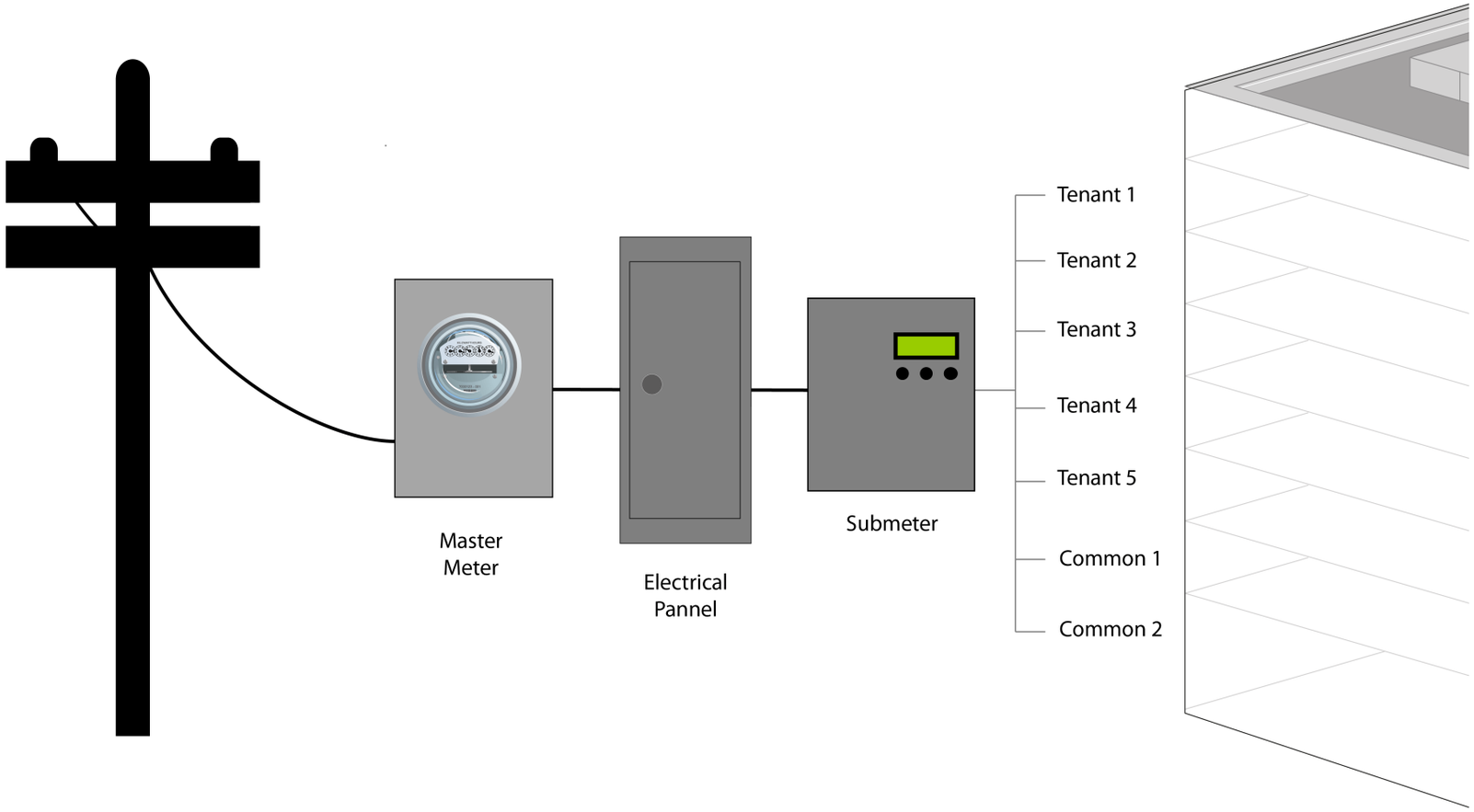
Fact, Fiction and Folly

Electrical submetering is now required for many residential and commercial buildings in the State of California. What does this mean for property managers and building owners, and how can they implement tenant submetering while avoiding costly mistakes?

WHAT IS ELECTRICAL SUBMETERING?

Many commercial and residential buildings in California use a single "master meter." Electricity comes into a building at bulk rate prices from the Utility. Landlords bill tenants for electricity based on flat fees or formulas derived from the building space they occupy. Occupants pay for electricity as part of a monthly bill, but their energy use is not individually tracked.

Electrical submetering is the measurement of consumption after the master meter. Submeters (also referred to as power meters, electrical meters, and energy monitors) are installed after the master meter to measure individual electrical load.



Submeters can measure energy use for tenants, departments, building equipment, or any other electrical load.

WHAT ARE THE BENEFITS OF ELECTRICAL SUBMETERING?

Submeters allow for the granular measurement of energy use, right down to the individual circuit. Building owners and property managers can pinpoint energy use, identify failing equipment, and allocate cost fairly by installing submeters. Tenants pay only for the electricity they use, can account for their consumption and conserve energy, and lower their electricity bills.

REDUCE ENERGY USE, SAVE MONEY

There are several strategies for reducing energy costs, but few are as compelling and fundamental as submetering. Many studies have shown that using submeters to allocate charges based on actual energy use is one of the most effective ways to reduce consumption.

Perhaps the most exhaustive study of applying electrical submetering to commercial buildings was undertaken by the U.S. Department ofEnergy as part of the Federal Energy Management Program (FEMP) in 2007.

How Much Could You Save ?

Action	Observed Savings	Reasons for Savings
Installation of Meters	0 — 2 %	Hawthorne Effect
Bill Allocation Only	2.5 — 5 %	Improved Awareness
Building Tune-up	5 — 15%	Improved Awareness and Identification of Simple Operations and Maintenance Improvements
Continuous Commissioning	15 — 45%	Improved Awareness, Identification of Simple Operation and Maintenance Improvements, Project Accomplishment and Continued Management Attention

This study showed that merely installing meters resulted in a 2% reduction in energy use through the Hawthorne Effect. [1]

But that was just the start. FEMP found that submetering aspart of a coherent, continuous commissioning program of benchmarking, analysis, and remediation can result in 15% to 45% savings. [2]

1. *The Hawthorne Effect refers to how people modify their behaviour when being observed or measured.*
2. *Making the Case for Energy Metering, ASHRAE*

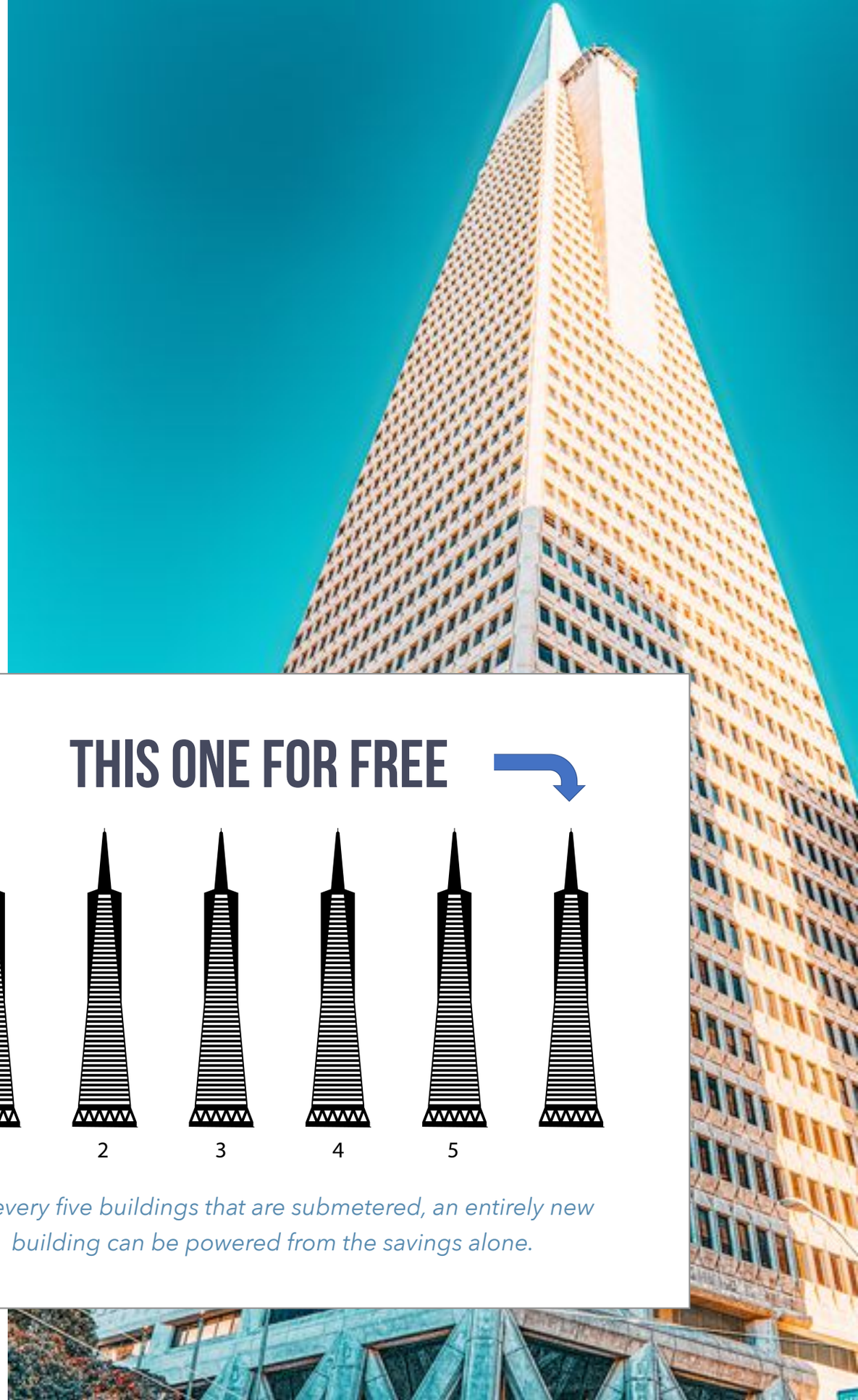
WIN, WIN, AND WIN

When tenants pay directly for their energy use, overall building consumption drops on average by 20%. That's an impressive saving that's comparable to installing an entire building automation system or changing all the windows in an office tower — at a fraction of the cost.

Put another way, for every five buildings that are submetered, an entirely new building can be powered from the saving.

With electrical submeters installed:

- √ Tenants win by saving money and reducing their energy use.
- √ Landlord's win with considerably lower energy and operational costs.
- √ The environment wins with significant reductions in greenhouse gas emissions.

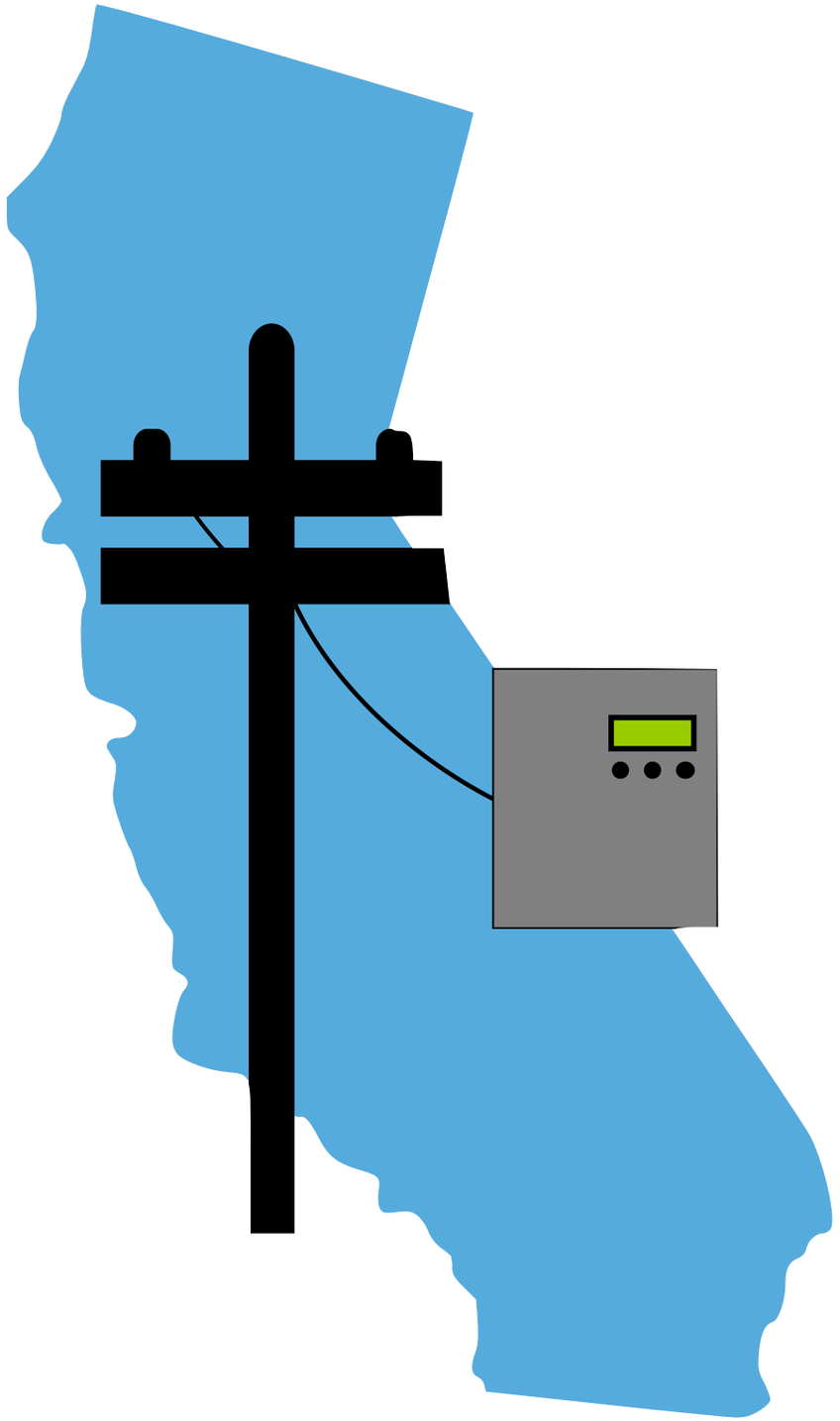


THIS ONE FOR FREE

For every five buildings that are submetered, an entirely new building can be powered from the savings alone.

WHAT LAWS GOVERN ELECTRICAL SUBMETERING IN CALIFORNIA?

California law requires the use of State-approved submeters when billing tenants. Additionally, new regulations under California's Code of Regulations introduce minimum requirements for electrical service metering — meaning many residential and commercial buildings are now required to submeter electricity.



METER APPROVAL

Before a submeter can be used for billing applications in California, it must be evaluated and endorsed by California's Department of Food and Agriculture through their California Type Evaluation Program (CTEP). It is illegal for a device to be used for tenant billing if it has not received Type approval from the Department.

The purpose of the evaluation is to certify that the design and performance of the meter meet all relevant California laws and regulations. Tests focus on accuracy, operational effectiveness, required markings, and fraud prevention features. Upon successful CTEP evaluation, a Certificate of Approval (COA) is awarded.

WHAT IS TITLE 24, PART 6?

California has long been a leader in energy conservation, first adopting "The Building Energy Efficiency Standards for Residential and Non-residential Buildings" in 1976. These standards have since evolved into Title 24 of the California Code of Regulations, also known as the California Building Standards Code, or "Title 24".

Title 24 lays out regulations that govern the construction and redevelopment of residential and non-residential buildings in California. The Standards contain energy and water efficiency requirements for newly constructed buildings, additions to existing buildings, and alterations to existing buildings.

Parts 6 and 11 of Title 24 address the need for regulations to improve energy efficiency and combat climate change. Other portions of Title 24 include building code, electrical code, fire code, and more.

The most significant efficiency improvements to the Standards came in 2019 and included alignment with ASHRAE 90.1 2017. ASHRAE 90.1 has been a benchmark for building energy codes in the United States and a fundamental basis for codes and standards worldwide for more than 35 years. ASHRAE 90.1 is also an industry-standard, referenced by the U.S. Green Building Council (USGBC) in the LEED building certification program — and frequently used as a baseline for comparison during energy retrofit projects.

"Title 24" is often used to refer specifically to the energy efficiency standards outlined in Title 24, Part 6. The State of California uses "Title 24" to refer to the building standards code in its entirety.

WHAT DOES THIS HAVE TO DO WITH SUBMETERING ?

In 2016, Title 24, Part 6 introduced the concept of measurement and verification (M & V) to track and analyze code compliance efforts. Section 130.5(a) & (b) of Part 6 have service metering requirements that include user-accessible metering of total electrical use from the whole building down to branch circuit monitoring – commonly referred to as "disaggregation of loads".

The submetering requirements for new or substantially remodelled non-residential, high-rise residential, and hotel/motel buildings are:

Section 130.5 (a) Service Electrical Metering Requirements: "each electrical service shall have permanently installed user-accessible metering of 'total energy use' as per the table below."

Section 130.5(b) Separation of Electrical Circuits for Electrical Energy Monitoring: "electrical power distribution systems shall be designed to permit the disaggregated measurement of electrical load energy uses downstream from the service meter."

The 50 Kilovolt-amps (kVA) entry-point is meant to target facilities of 5,000 square feet and larger. However, much smaller projects also can be affected depending on their heating and cooling loads. Understanding a building's energy intensiveness is key to determining a path towards Title 24 compliance.

Meter Type	Services rated 50 kVA or less	Services rated more than 50 kVA and less than or equal to 250 kVA	Services rated more than 250 kVA and less than or equal to 1,000 kVA	Services rated more than 1,000kVA
Instantaneous (at the time) kW demand	Required	Required	Required	Required
Historical peak demand (kW)	Not required	Not required	Required	Required
Resettable kWh	Required	Required	Required	Required
kWh per rate period	Not required	Not required	Not required	Required

Source: California Energy Commission, 2013 Building Energy Efficiency Standards

PROTECTION FOR TENANTS

Many safeguards have been built into California's energy standards to protect tenants. If the use of submeters results in tenant billing, several processes and procedures must be followed, including those related to:

- Visibility of energy used by tenants
- Disclosure of the cost of electricity to the building owner
- The types of meters that are approved for tenant billing by California's Department of Food and Agriculture (CDFA)
- Meter sealing requirements

HOW MUCH COST AND EFFORT IS INVOLVED ?

Submetering has developed considerably from its humble origins — with several advancements that have made circuit branch monitoring reliable and economical.

THE MORE THE MERRIER

The evolution of multi-point electrical meters has created a cost-effective way to meet Title 24 Part 6, 130.5(b) requirements.

Multi-point meters can isolate and monitor energy use by circuit, aggregate circuit-level data in any combination required, and easily adjust to circuit changes as building organization changes over time.

Existing buildings don't need costly rewiring or expensive extra equipment. For new builds, panels can be installed with less labour since no additional time is needed to validate complex layouts.

Multi-point meters have the added advantages of having a much smaller footprint than multiple single-point meters and lower per meter point deployment, integration, and maintenance costs.

Multi-point meters allow for the metering of 6 or more circuits depending on the model and need.

They are useful when measuring a large concentrations of circuits and a viable option for multi-load, granular data requirements.

Multi-point meters much smaller footprint than multiple single point meters and lower per meter point deployment, integration, and maintenance costs than single point meters.

One multi-point meter (in yellow circle) replaces multiple, single-point meters.

SUBMETERS BEWARE!

While the cost and effort of submetering are well within scope for most building projects, there are several things property managers and building owners need to pay attention to when deploying submetering to meet Title 4 compliance, including:

- ✓ A clear understanding of your building's energy intensiveness, so you know for sure if your facility falls under sections 130.5 (a) and (b) of Title 24 Part 6.
- ✓ Complete knowledge of tenant rights as they pertain to electrical submetering and tenant billing.
- ✓ What, precisely, needs to be measured for compliance? How should it be measured? How often? Do you need to keep a historical record of energy use?
- ✓ The risks and consequences of non-compliance. Who enforces it? What are the costs of non-compliance? How do you demonstrate compliance?
- ✓ Which meters are approved for tenant billing by the CDFA?
- ✓ How long can you expect to be able to use a meter?
- ✓ What happens when technology and communication protocols evolve? Will your chosen meter keep pace?

ADDITIONAL RESOURCES

For more on multipoint Electrical Submetering:

From Space Saver to Information Cornerstone: The Evolution of the Multi-Point Electrical Meter

Making the Case for Electrical Submeters

How to Choose the Right Electrical Submeter

For more on California Title 24:

California Title 24, Part 6 and 11, California Energy Commission

California Energy Commission: Title 24 Standards, Compliance Manuals, Compliance Documents, etc.

TRIACTA SUBMETERS

California State law requires the use of approved submeters when billing tenants in multi-unit residential buildings. Additionally, new regulations under California Title 24 introduce minimum requirements for electrical service metering for commercial and high-rise residential buildings.

Triacta submeters are approved under the California Code of Regulations and independently verified to ANSI C12.20 Class 0.5 — allowing you to easily meet Title 24 requirements.

ABOUT TRIACTA

Triacta Power Solutions designs and manufactures revenue-grade electrical submeters for tenant billing and energy management applications. Triacta is a subsidiary of Metergy Solutions Inc., one of North America's most experienced submetering providers.

Long known for its high-reliability, precise, multi-protocol submetering products, Triacta's meters have been easily and successfully deployed by submetering companies, property owners, building system integrators, and local distribution companies since 2003.

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